



Northeastern University

Catalogs of

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THE GRADUATE SCHOOL

Arts and Sciences

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1961-1962
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(Coeducational)

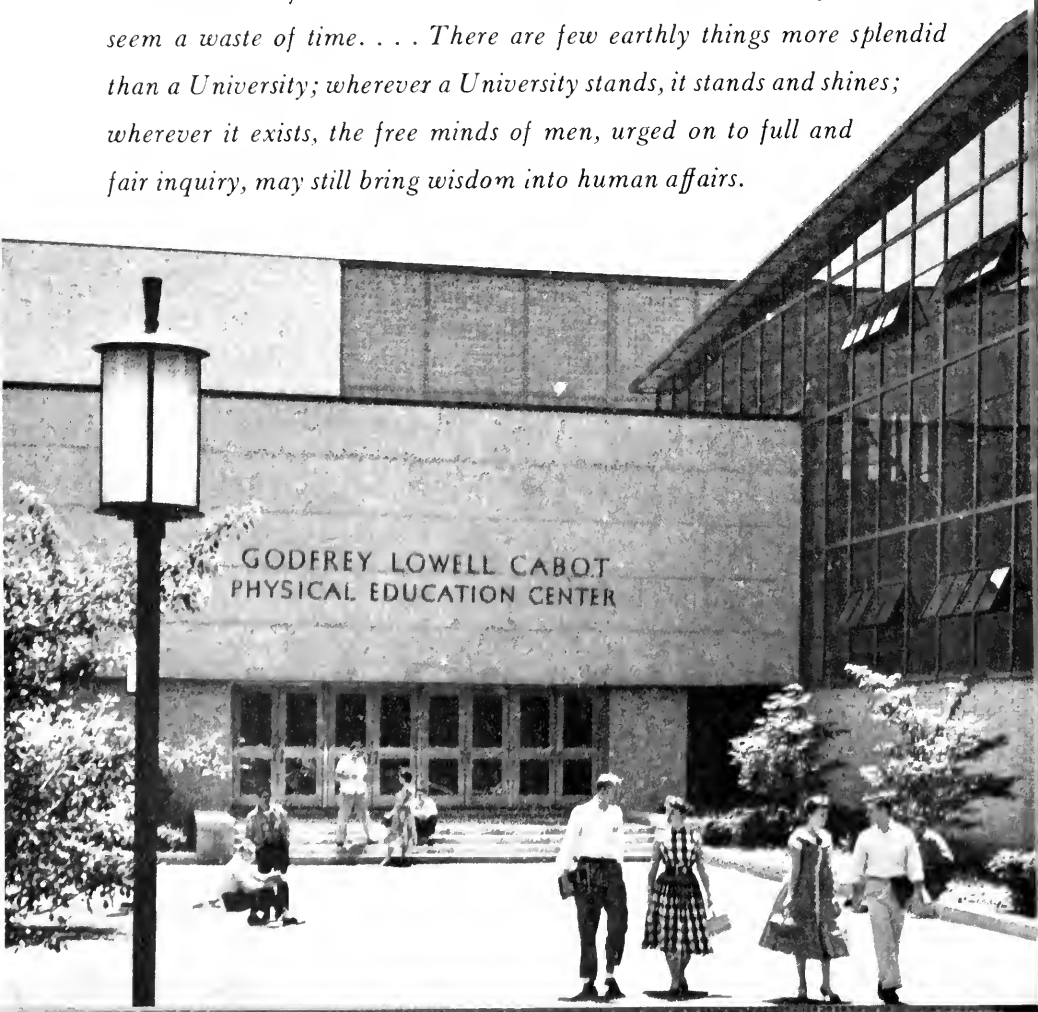
A UNIVERSITY

by

JOHN MASEFIELD

Poet Laureate of England

There are few earthly things more beautiful than a University. It is a place where those who hate ignorance may strive to know; where those who perceive truth may strive to make others see; where seekers and learners alike, banded together in the search for knowledge, will honor thought in all its finer ways. . . . It gives to the young in their impressionable years the bond of a lofty purpose shared, of a great corporate life whose links will not be loosed until they die. It gives young people that close companionship for which youth longs, and that chance of the endless discussion of themes which are endless — without which youth would seem a waste of time. . . . There are few earthly things more splendid than a University; wherever a University stands, it stands and shines; wherever it exists, the free minds of men, urged on to full and fair inquiry, may still bring wisdom into human affairs.



NORTHEASTERN UNIVERSITY

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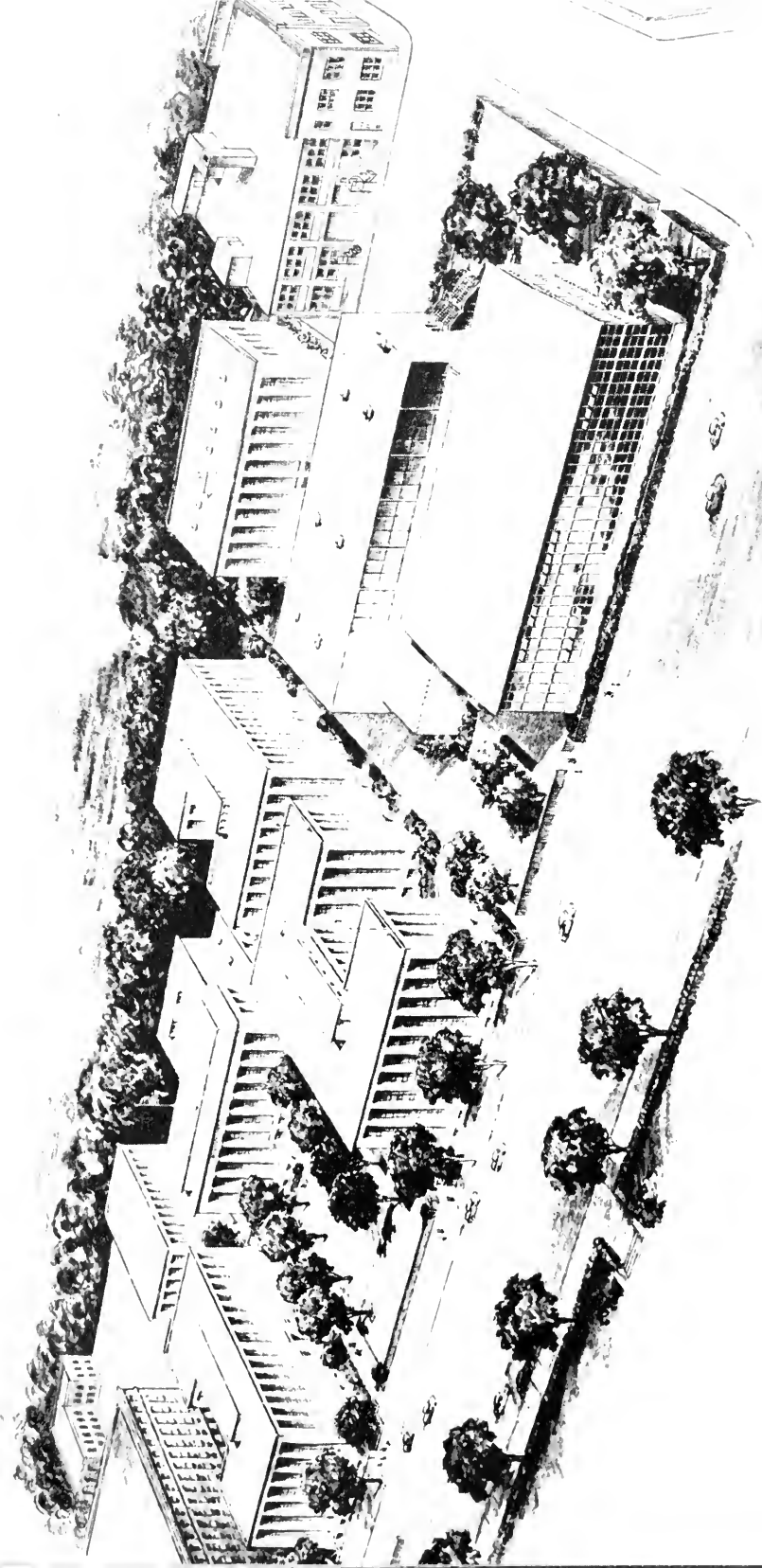
COLLEGE OF LIBERAL ARTS

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- (c) For specific purposes which may especially appeal to the donor.

It is suggested that, when possible, those contemplating gifts or bequests confer with the President of the University regarding the University's needs before legal papers are drawn.

The legal name of the University is "Northeastern University." However, in the making of gifts and bequests to Northeastern the following wording is suggested: "Northeastern University, an educational institution incorporated under the laws of Massachusetts and located in Boston, Massachusetts."

ACADEMIC CALENDAR

September 1961 to September 1962

September 6 (Wed.): REGISTRATION for September Freshmen. Students must register by noon on this date if they wish places reserved for them in the entering class.

September 6-8 (Wed.-Fri.): ORIENTATION WEEK EXERCISES. Attendance of all September Freshmen is required.

September 11 (Mon.): REGISTRATION for Div. A Upperclassmen. Classes for ALL students begin at 1 p.m. on special schedule.

October 12 (Thurs.): Columbus Day. No classes.

November 13-17 (Mon.-Fri.): Final examination period for Upperclassmen and for Term 1 for September Freshmen.

November 15 (Wed.): REGISTRATION for November Freshmen. Students must register by noon on this date if they wish places reserved for them in the entering class.

November 15-17 (Wed.-Fri.): ORIENTATION WEEK EXERCISES. Attendance of all November Freshmen is required.

November 20 (Mon.): REGISTRATION for Div. B Upperclassmen. Classes for ALL students begin at 1 p.m. on special schedule.

November 23 (Thurs.): Thanksgiving Day. No classes.

December 22 (Fri.): Classes end at 5 p.m. for Christmas recess and reconvene December 28 at 9 a.m.

January 1, 1962 (Mon.): New Year's Day. No classes.

January 22-26 (Mon.-Fri.): Final examination period for Upperclassmen, for Term 2 for September Freshmen and for Term 1 for November Freshmen.

January 29 (Mon.): REGISTRATION for Div. A Upperclassmen. Classes for ALL students begin at 1 p.m. on special schedule.

February 20 (Tues.): Classes end at 5 p.m. and reconvene February 26 at 9 a.m.

April 2-6 (Mon.-Fri.): Final examination period for Upperclassmen, for Term 3 for September Freshmen and for Term 2 for November Freshmen.

April 9 (Mon.): REGISTRATION for Div. B Upperclassmen and for those September Freshmen electing to take Term 4 in April. Classes for ALL students begin at 1 p.m. on special schedule.

April 19 (Thurs.): Patriots' Day. No classes.

May 11 (Fri.): End of five-week term for those September Freshmen taking Term 4 in April.

May 30 (Wed.): Memorial Day. No classes.

June 11-15 (Mon.-Fri.): Final examination period for Upperclassmen and for Term 3 for November Freshmen.

June 18 (Mon.): REGISTRATION for Div. B Upperclass five-week term and for those November Freshmen electing to take Term 4 in June. Classes for ALL students begin at 11 a.m. on special schedule.

July 20 (Fri.): End of Upperclass five-week term and of Term 4 for November Freshmen.

August 6 (Mon.): REGISTRATION for Div. A Upperclass five-week term and for the optional Term 4 for those students who did not attend in April or June. Classes for ALL students begin at 11 a.m. on special schedule.

September 3 (Mon.): Labor Day. No classes.

September 7 (Fri.): End of Upperclass five-week term and of the optional Term 4 for those students who did not attend in April or June.

September 10 (Mon.): REGISTRATION for Div. A Upperclassmen. Classes begin at 1 p.m. on special schedule.

Aims and Scope of the University

Founded in 1898, Northeastern University is incorporated as a privately endowed non sectarian institution of higher learning under the General Laws of Massachusetts. The State Legislature by special enactment has given the University general degree-granting powers. The University is governed by a Board of Trustees who are elected by and from the Northeastern University Corporation, which is composed of more than one hundred and twenty-five distinguished business and professional men.

From its beginning Northeastern University has had as its dominant purpose the discovery of community educational needs and the meeting of these in distinctive and serviceable ways. The University has not duplicated the programs of other institutions, but has sought to pioneer new areas of educational service.

A distinctive feature of Northeastern University is its Co-operative Plan, initiated by the College of Engineering in 1909 and subsequently adopted by the Colleges of Business Administration (1922), Liberal Arts (1935), and Education (1953). This serviceable educational method enables students to gain valuable practical experience as an integral part of their college programs and also provides the means by which they may contribute substantially to the costs of their education. The plan has been extended to the graduate level in several fields of engineering in co-operation with industrial corporations located throughout the United States.

In the field of adult education, programs of study have been developed to meet a variety of needs. Since 1906 evening curricula have been offered leading to the bachelor's degree in business. This program has been carefully planned to serve mature students who are employed full time during the day but who are desirous of broadening their educational background by part-time study. Similar evening programs in the arts and sciences, in engineering, and in teacher education have been added in recent years. All formal courses of study leading to degrees through evening programs are approved by the appropriate college faculty and are subject to the same quantitative and qualitative standards as the regular day curricula.

The following is a brief outline of the aims and scope of the University's programs.

I. The Five Colleges

1. The College of Liberal Arts

The College of Liberal Arts offers majors in the usual fields of the arts and sciences leading to the degrees of Bachelor of Arts and Bachelor of Science. With the exception of pre professional programs, day curricula are normally five years in length and operated on the Co-operative Plan. In all majors except Chemistry and Physics, however, qualified students with the approval of the Dean may elect to complete requirements for the degree on a full-time plan in four years.

The College also offers a number of its courses during evening hours, constituting a program leading to the Bachelor of Arts degree with curricula in economics, English, history, government, and sociology.

2. The College of Education

The College of Education offers the option of study on the conventional four-year full-time plan or on the five-year Co-operative Plan which provides for a period of teacher-internship in various school systems of the Greater Boston area. Both programs lead to the degree of Bachelor of Science in Education and are designed particularly to meet the needs of high school graduates who desire to prepare themselves for teaching or administrative positions in elementary and secondary schools.

The College also offers evening curricula leading to the degree of Bachelor of Science in Education in co-operation with the College of Liberal Arts.

3. The College of Business Administration

The College of Business Administration offers both day and evening programs of study in the principal fields of business leading to the degree of Bachelor of Science in Business Administration. The day programs are offered on the five-year Co-operative Plan under which students gain substantial practical experience in the fields for which they are preparing as an integral part of their undergraduate course of study.

4. The College of Engineering

The College of Engineering offers five-year co-operative curricula in civil, mechanical, electrical, chemical, and industrial engineering leading to the degree of Bachelor of Science with specification according to the engineering department in which the student qualified.

The College also offers during evening hours a full program leading to the degree of Bachelor of Science in Electrical Engineering. This program extends over nine years, covers the identical courses given in the day co-operative curriculum, and meets the same qualitative and quantitative standards of scholarship.

5. University College

University College, so called because it draws upon the resources of the other Colleges of the University, offers courses of study leading to certificates, associate degrees, or to Bachelor of Science degrees with specification of field of concentration. Programs of the College are designed specifically to meet the needs of older, more mature students who wish to undertake part-time programs of education during evening hours.

Although it is exclusively an evening College, the quality standards of instruction and the requirements for its degree are wholly consistent with those of the other Colleges of Northeastern University. University College does not duplicate the offerings of the Colleges of Liberal Arts, Business Administration, Education, and Engineering, but provides curricula which cut across traditional subject matter areas and meet the particular needs of adults desiring formal programs of professional development on a part-time basis.

II. The Graduate School

The Graduate School of the University offers day and evening programs of study leading to appropriate master's degrees in the fields of arts and sciences, education, business, and engineering. Some of these programs are offered on the Co-operative Plan; others provide teaching and research fellowships for able candidates. Administrative headquarters for all graduate programs are located on the first floor of the Graduate Center Building, where the offices of the Dean and of the several directors of professional programs are located.

III. Lincoln Institute

Lincoln Institute offers evening programs of study in several fields of science and engineering technology leading to the degree of Associate in Science or Associate in Engineering. The courses of study are of college grade and cover much of the technological subject matter customarily included in schools of engineering, but the curricula are less extensive in scope than those required for the baccalaureate degree in engineering. They prepare students to work with professional engineers in various technical capacities.

IV. Adult and Continuing Education

The Office of Adult and Continuing Education provides special programs and services for the business and industrial community. These include programs in management development, and seminars, conferences, institutes, and forums designed to communicate information about current trends in various areas. The Office also sponsors a Bureau of Business and Industrial Training which sets up both off-campus and on-campus, short-term, non-credit courses to meet the specific training needs of industrial organizations in New England.

V. Research Activities

The faculty of the University are engaged in a wide variety of basic research projects in business, science, social science, and engineering. These are co-ordinated by the Dean of Research Administration whose services are University-wide and available to the faculties of all the Colleges.

Although Northeastern is primarily concerned with undergraduate and graduate instruction in the areas of arts and sciences, business, engineering, and teacher education, the University believes that the most effective teaching and learning takes place in an environment characterized by research activities directed toward extending the frontiers of knowledge.

Buildings and Facilities

Location

Northeastern University is located on Huntington Avenue in the Back Bay section of Boston. The main administrative offices of the University are located in Richards Hall.

The chief railroad centers of Boston are the North and South Stations. To reach the University from the North Station, board an MTA subway car going to Park Street and transfer there to any Huntington Avenue car. To reach the University from the South Station, board a Cambridge-bound subway train and transfer at Park Street to a Huntington Avenue car. The "Northeastern" station is the first stop outside the subway.

Huntington Avenue Campus

The principal educational buildings of Northeastern University are located on a sixteen-acre site in the Back Bay section of Boston. Only one block to the west of the University lie the famous Boston Museum of Fine Arts and the beautiful public gardens-park reservation known as "The Fenway." The newer buildings of the Huntington Avenue Campus are pictured on page 4.

Following a long-range development plan, University facilities have expanded substantially in recent years. In addition to the seven buildings constructed within the last two decades, several modernized older buildings are available for specialized uses. The newer buildings on the campus are interconnected by means of tunnels, so that the students may go from building to building without going out of doors in inclement weather. All of the buildings are used in common by the students of the four Basic Colleges.

In addition to classrooms and instructional offices, the principal buildings include the following:

Botolph Building - Civil Engineering Laboratories

Cabot Physical Education Center - Gymnasium, Cage, Rifle Range

Dodge Library - Library, Drawing Rooms

Ell Student Center - Student Activities, Chapel, Auditorium, and University Commons.

Forsyth Building - Industrial and Mechanical Engineering Laboratories, Health Service

Graduate Center - Administrative Offices of the Graduate School, Physics Laboratories, and Cafeteria.

Greenleaf Building - ROTC Headquarters, Research Facilities

Hayden Hall - Adult and Continuing Education Office, Lincoln Institute Office, Business, Education, and Electrical Engineering Laboratories, Art Studio.

Richards Hall - Administrative Offices, Mechanical Engineering, Psychology and Chemistry Laboratories, Bookstore

Science Hall - Chemical Engineering and Biology Laboratories

The Co-operative Plan

What It Is

The Co-operative Plan of Education is founded on the educational philosophy that supervised employment in the occupational field for which a student is training enhances comprehensive learning and vocational adaptation. It utilizes, in addition to the usual classroom and laboratory exercises, the practical values of the workaday-world environment, thereby enabling the student to become acquainted with certain job skills and operations concurrently with his academic training. It also helps to develop the student's confidence and capacity to arrive at intelligent conclusions based upon a knowledge of practice as well as theory.

The Co-operative Plan is particularly designed to serve the needs of the recent high school graduate rather than the older, more mature student who already may have had considerable work experience.

All Northeastern co-operative curricula are five years in length, comprising a freshman year of three consecutive ten-week terms of academic study followed by four upperclass years on the Co-operative Plan.

How It Works

The Co-operative Plan works in the following manner. Upperclassmen, including both men and women, are divided into two nearly equal groups, one of which is called Division A and the other, Division B. Each student is assigned a job with some business or industrial concern. The Division A students start the college year with a term of classroom work, while the Division B students start the year with a term at co-operative work. At the end of that term, the Division A students go out to work with a co-operating firm, while their places in the classrooms are then taken by their alternates, the corresponding Division B students.

When the next term has passed, the Division A students return to college and the Division B students resume their co-operative work. The alternation of work and classroom study continues throughout the year so that each upper-classman has two terms of ten weeks and one of five weeks at college, two terms - one of ten weeks and one of sixteen weeks - at co-operative work, and a one-week vacation.

Similarly, each co-operating employer is thus assured of continuous service of a pair of co-operative students alternating with each other throughout the calendar year. This assurance naturally tends to stabilize employment and encourages the co-operation of employers.

Faculty Co-ordinators

Each student is assigned to a co-ordinator who is responsible for all phases of the co-operative work program for his group of students. He interviews them during the freshman year and discusses with them various vocational objectives and answers such questions as the students may have in regard to

the many activities of business and industry. He studies them in the light of their physical condition, scholastic attainment, interests, aptitudes, and other factors bearing upon their qualifications for vocational assignment. These interviews culminate in an agreement between the student and his co-ordinator regarding the co-operative assignment on which the student will be placed. During each of the terms at college immediately succeeding a term at co-operative work, the co-ordinator confers with the student concerning the job experiences acquired and other matters relating to vocational adjustment or personal problems while on the job. The reports of the employer on the achievements and performance of the student are discussed and interpreted in the interest of further co-ordination and more effective learning. In this way the progress of all students is observed and co-ordinated with their college work to the end that maximum values are obtained from their training at Northeastern.

Placement

The co-ordinator visits co-operating firms and arranges with them for the employment of students under his charge. The range of opportunities available to Northeastern students is wide, including practically all occupational activities for which their academic training, personal attributes, and vocational aptitudes qualify them. In general, the first year of co-operative work can be expected to be of a routine nature through which students may prove their fitness for more responsible work. A job assignment directly related to the student's field of study and vocational training is the prime objective of the co-ordinator. The jobs on which Northeastern students are employed are in no sense protected opportunities or purely observational assignments. They are regular jobs under actual business conditions and are held in competition with other sources of supply. The only special privilege accorded Northeastern students is that of attending college on the Co-operative Plan and the opportunity to merit by superior performance progressive advancement on the job.

Because of uncertainties of business conditions, as well as other reasons beyond its control, the University cannot and does not guarantee to place students. However, past experience has demonstrated that students who are willing and capable of adapting themselves to existing conditions are almost never without employment except in periods of severe industrial depression.

Supervision and Guidance

While the University does not adopt a paternal attitude toward co-operative work, it nevertheless assumes certain responsibilities toward students and co-operating firms. Co-ordinators visit regularly each job to which students in their charge are assigned. They solicit from the employer an oral report upon the student's progress and achievement. This supplements the card report sent to the co-ordinator at the close of each work term. Any adjustments that may have seemed necessary or advisable are arranged at this time. Progress on assignments, schedules of training, advancement, and transfers to new responsibilities are discussed and evaluated.

Through a series of co-operative work reports prepared during their working periods, students are led to analyze their jobs and to develop a thoughtful and investigative attitude toward their working environment. A most important phase of co-operative work is the opportunity afforded for guidance by the frank discussion of actual problems encountered on the job. The personal contact between co-ordinator and student is of great value in helping the student to get the most from the co-operative work assignment. While the University endeavors to provide every possible opportunity for its students, it expects them at the same time to take the initiative and to assume the responsibility involved in their individual development. To every student are available the counsel and guidance of the faculty, and every resource at its disposal. But the faculty does not coerce students who are uninterested or unwilling to think for themselves.

The Co-operative Plan is thus designed specifically to provide actual working opportunities which afford the students practical experience, give meaning to their program of study, and train them in reliability, efficiency, and teamwork.

Location of Work

It is the policy of the University to assign students to co-operative work within commuting distance of their homes. This is not always possible, however, and at times it may be necessary for students to live away from home in order to obtain satisfactory and desirable co-operative work assignments.

Types of Co-operative Work

Insofar as possible, students are placed at co-operative work in that general field for which they express preference, provided that aptitude, physical ability, temperament, and other personal qualities appear to fit them for this field. Usually students are placed first in those jobs of an organization where they may learn the fundamental requirements of the business.

For example, the assignment for the first year of a training program in a manufacturing establishment might be as an operator of machines. This provides the opportunity to acquire detailed knowledge of the equipment, methods, and operations of some of the departments processing raw materials, and of the products being manufactured.

The second year he might be an expeditor or on assignment with the maintenance or installation department. Such work would require contact with the several production and operating departments of the plant and would provide the opportunity for a comprehensive and correlated study of all operations, plant layout, routing of raw, semi-processed, and finished materials - in other words, a perspective view of the interrelationship of departments.

By this time, the student will have progressed to the academic stage where "application" courses will be included in the program and the next year of co-operative work might be devoted to testing, inspecting, methods analysis, or the like. The last year would be devoted to initial training in that department for which the student was aiming ultimately to qualify.

Thus, in the course of a period of four years of co-operative training, the student would have the opportunity to acquire a substantial background in at least some of the functions of the factory administration. This progressive type of training is ordinarily obtained in the employ of one company. A change of company each year usually proves more a change of environment than a progression of experiences.

All types of enterprises employ Northeastern co-operative students. The limitation is determined by the interests and career objectives of the students enrolled at the time. They include engineering firms, manufacturing companies, public utilities, banks, railroads, insurance companies, wholesaling and retailing outlets, hospitals, social agencies, publishers, advertising houses, libraries, schools, and development and research organizations. Definite training schedules have been established with several of the co-operating companies. The ultimate objective of such schedules is absorption of the graduates into the permanent employ of the company, although such absorption is based on merit rather than guarantee.

Admission Requirements

Applicants for admission to the freshman class must qualify by graduation from an accredited secondary school and must earn the recommendation of their principal or guidance counselor for the particular program to which they have applied. The most important single factor among the credentials submitted to the Committee on Admissions is the candidate's record of achievement in high school or preparatory school.

Application for Admission

A combined Application for Admission and School Record form may be obtained by writing to the Department of Admissions, or may be secured at the time of the admissions interview at the University. Directions for the proper use of these forms are included on the blank. The Application for Admission should be filled out in ink, properly signed, and forwarded with a non-returnable ten-dollar fee to the Dean and Director of Admissions, Northeastern University, Boston 15, Massachusetts. Checks should be made payable to Northeastern University.

Early Decision Plan

Well-qualified students, who have chosen the Co-operative Plan of Education at Northeastern University by the end of the junior year or very early in the senior year, may apply for admission under the Early Decision Plan. The Plan is intended for those with superior secondary school records who are strongly recommended by their principals or guidance officers and who have done well in the scholastic aptitude test of the College Entrance Examination Board taken in the spring of the junior year. A decision on admission will be mailed not later than early December of the senior year if you qualify under this Plan. Full details about Early Decision may be secured from the Department of Admission.

Entrance Examinations

All candidates are required to write both the morning aptitude tests and the afternoon achievement tests of the College Entrance Examination Board. The achievement tests which you write will be determined by the particular college or program of studies to which you have applied. The following may be referred to as a guide:

All Colleges	English Composition
Engineering	
Liberal Arts (Mathematics and Science)	Advanced Math.
Education (the Teaching of Mathematics and Science)	Physics or Chem.
Liberal Arts (Premedical, Predental, Biology, Premedical Technology, Psychology)	Inter. Math. or a science Choice of one
Liberal Arts (Non-science fields)	
Business Administration	Choice of two
Education (Non-science fields)	

Applicants for admission should write the aptitude tests in December, January, or February. Normally, the achievement tests should be written in March. In some instances, however, they may be written in May. The earlier achievement testing date is preferred except for those students who are candidates for the second section of the freshman class, which registers in November. You are advised to discuss with your guidance counselor plans for completing the College Entrance Examination Board testing requirement. There is a growing trend among high schools to encourage tests in the junior year. These test results may be sent to the Committee on Admissions for purposes of counseling and guidance if the applicant so wishes. Early Decision candidates should plan definitely on completing testing requirements in May of the junior year.

For full testing information and an application form, candidates may make arrangements through their schools or may write directly to this address:

College Entrance Examination Board
P. O. Box 592, Princeton, New Jersey

You should request the Board to send your scores on each set of examinations to Northeastern University.

College of Liberal Arts

The College of Liberal Arts offers three broad areas of study. Since the freshman year program is different in each of these areas, entrance requirements also vary.

All curricula:

Subject	Units
English (4 years)	3
Foreign language (2 years)	2
Mathematics (at least 1 year)	1
Science (at least 1 year)	1
Other college preparatory subjects	4
Electives, not more than	4
	<hr/> 15

The following curricula must include these mathematics and science units:
Biological science curricula (including Premedical, Predental, Medical Technology, Biology)

Algebra, through quadratics, and Plane Geometry	3 units
Biology or Chemistry	1 unit

Science curricula (Physics, Chemistry, Mathematics)

Algebra, through quadratics; Plane Geometry and Trigonometry	3 1/2 units
Physics	1 unit

College of Education

While secondary school students who complete a college preparatory program are, in general, preferred, admission to the College of Education is open to others as well. Important to the future teacher is high ability in the communication skills and adequate strength in the field of special interest. As important as the pattern and quality of an applicant's preparation are the personal qualifications which contribute to success in teaching.

All applicants are expected to have completed the following subject matter units:

Subject	Units
English (4 years)	3
Mathematics (at least 1 year)	1
Science (at least 1 year)	1
Other college preparatory subjects	6
Electives, not more than	4
	<hr/> 15

Students who wish to major in the teaching of Mathematics and Science must be able to present these units:

Algebra, through quadratics; Plane	
Geometry and Trigonometry	3 1/2 units
Physics	1 unit

It is desirable for students who wish to major in Physical Education to be able to present one unit in biology as preparation for the freshman-year course in anatomy and physiology.

College of Business Administration

Preferred as applicants to the College of Business Administration are those students who are graduates of college preparatory programs of study. Other applicants may be admitted on the recommendation of their principals and guidance officers. The following subjects are, generally, prescribed as entrance requirements:

Subject	Units
English (4 years)	3
Mathematics	1
Science	1
Other college preparatory subjects	6
Electives, not more than	4
	<hr/> 15

College of Engineering

It is important that applicants for admission to the College of Engineering complete successfully the full sequence of secondary school courses in English, mathematics, and science. The following subjects are required:

Subject	Units
English (4 years)	3
Physics	1
Algebra (through quadratics)	2
Plane Geometry and Trigonometry	1 1/2
Other college preparatory subjects	5 1/2
Electives, not more than	2
	<hr/> 15

Other Requirements

Formal requirements are necessary and desirable in that they tend to provide all entering students with a common ground upon which the first year of

the college curriculum can be based. But academic credits alone are not an adequate indication of a student's ability to profit by a college education. Consequently, the Department of Admissions takes into consideration a student's interests and aptitudes insofar as they can be determined, capacity for hard work, attitude toward classmates and teachers in high school, physical stamina and, most important of all, character. In this way the University seeks to select for its student body those who not only meet the academic admission requirements but who also give promise of acquitting themselves creditably in the rigorous program of training afforded by the Co-operative Plan and of becoming useful members of society.

Personal Interview

Effective guidance depends in large measure upon a complete knowledge of a student's background and problems. Although a personal interview is not required, except for scholarship applicants and those who apply for admission to the College of Education, applicants are cordially welcome to come to the University to discuss their educational plans. The Admissions Office, 150 Richards Hall, is open on Monday through Friday from 9:00 a.m. to 4:00 p.m. and on Saturday morning from 9:00 a.m. to 11:00 a.m. Students are encouraged to arrange definite appointments for interviews.

Registration

Freshmen in the day programs will register at the University on Wednesday, September 6, 1961, and Wednesday, November 15, 1961. Students are not considered to have met the requirements for admission until they have successfully passed the required physical examination. Registration must be in person.

Transfer or Advanced Standing

As a basic policy, students who wish to transfer to Northeastern in the same area of study, whether they seek credit or not, must have completed a satisfactory record in the institution in which they previously studied. Transfer students are admitted only in September and November.

The Co-operative Plan makes transfer of credits difficult, since it is impossible to carry a combination schedule of freshman and upperclass subjects. A candidate for advanced standing should, therefore,

1. Have had courses which enable him to enter at the beginning of a year and thereafter continue as a regular student.
2. Have earned average grades or better in his previous college work. (No credit is given for the lowest passing mark.)
3. Have satisfactorily written recently the College Board examinations.

Persons who already have a bachelor's degree, regardless of their field of specialization, are not ordinarily accepted for admission as undergraduates.

Outline of Freshman Courses

The first year is a period of full-time study during which the student must demonstrate fitness for the program which has been elected. For students enrolled in the Colleges of Liberal Arts, Education, Business Administration, or Engineering, the Co-operative Plan of training on the job begins with the second year. Students who are unsuccessful in the basic courses of the freshman year will not be permitted to continue with their advanced program, but will be advised to change their goal and type of training. In some instances this will mean change to another curriculum at Northeastern; in others, withdrawal from the institution. The freshman courses are so arranged as to permit change of objective during or at the end of the first year with a minimum loss of time.



College Expenses

Tuition and Fees

Freshmen- The charge for tuition for all freshmen is \$250.00 per term, payable as indicated in the schedule below.

Engineering Upperclass Students- The charge for tuition for all Engineering upperclassmen is \$340.00 per regular term and \$170.00 per summer term.

Liberal Arts, Education, and Business Administration Upperclass Students- The charge for tuition for all Liberal Arts, Education, and Business Administration upperclassmen is \$300.00 per regular term and \$150.00 per summer term.

Student Teaching- The charge for student teaching in the College of Education is \$150.00.

Schedule of Tuition and Fee Payments, 1961-1962

For Freshmen

DIVISION S		Tuition and Fee	DIVISION N	
September 6, 1961	.....	\$250	.....	November 15, 1961
November 20, 1961	.....	250	.....	January 29, 1962
January 29, 1962	.....	250	.....	April 9, 1962

The first term of the sophomore year, a five-week summer term, may be taken by Division S freshmen either in April immediately following the freshman year or in August, and by Division N freshmen either in June or August. Payments are due on the first day of the term in which the work is taken. Payment for tuition in this five-week term is one-half of upperclass tuition for the ten-week term.

For Upperclassmen (Co-operative Plan)

DIVISION A		Tuition and Fee	Tuition and Fee
		Engineering	Liberal Arts, Education and Business Admin.
September 11, 1961	.....	\$340	..... \$300
January 29, 1962	.....	340	..... 300
*August 6, 1962	.....	170	..... 150

DIVISION B		Tuition and Fee Engineering	Tuition and Fee Liberal Arts, Education and Business Admin.
November 20, 1961	.....	\$340	\$300
April 9, 1962	.....	340	300
*June 18, 1962	.....	170	150

*Summer term (five weeks).

Full-Time Plan

Certain students in the Colleges of Liberal Arts and Education may elect non-co-operative full-time programs. Tuition rates are the same as for students on the Co-operative Plan, and payments are due on the corresponding dates.

Tuition Deposit

Applicants accepted for admission must upon request pay a nonreturnable tuition deposit of fifty dollars (\$50.00) as evidence of their intention to enroll, and this will be applied on their first tuition payment.

Payment of Tuition

All payments should be made at the Bursar's Office which is located on the second floor of Richards Hall. Checks should be made payable to Northeastern University. Students are not eligible to attend classes beginning with the second week of any term unless their tuition has been paid or specific arrangements have been made with the Registrar for a plan of deferred payment. Deferred payment of tuition entails a fee of two dollars (\$2.00).

Accident and Sickness Insurance

An excellent low-cost accident and illness insurance covering "in-hospital" care is available to all Northeastern University students through a group insurance plan. The cost of this insurance is eighteen dollars (\$18.00) for the calendar year, payable in advance. Students living away from home are required to participate in the plan; commuters may do so if they wish. Circulars giving details of the insurance coverage will be sent to all candidates at the time their applications for admission to the University are accepted.

Chemical Laboratory Deposit

Freshmen taking chemistry make a Chemical Laboratory deposit of fifteen dollars (\$15.00) at the beginning of the year from which deductions are made for breakage, chemicals, and destruction of apparatus in the laboratory.

Upperclassmen taking chemistry or chemical engineering laboratory work make deposits at the beginning of each such term as follows:

Sophomores and Middlers	.....	\$10
Juniors	.....	20
Seniors	.....	15

Reserve Officers' Training Corps - Uniform Deposit

Freshmen enrolling in ROTC make a deposit of ten dollars (\$10.00) to cover loss of or damage to ROTC uniform and equipment. Any loss or damage exceeding the deposit will be charged to the student.

Application Fee

A fee of ten dollars (\$10.00) is required when the application for admission is filed. This fee is nonreturnable.

Late Registration Fee

A fee of five dollars (\$5.00) will be charged for failure to register in accordance with prescribed regulations on the dates specified in the college registration bulletins. Registration must be made in person.

Graduation Fee

A fee of twenty dollars (\$20.00) covering graduation is required by the University of all candidates for a degree. This fee must be paid before the end of the fifth week of the last scholastic term in the senior year.

Estimated College Expenses for a Freshman

The following data, compiled from expense returns submitted by the student body, give an idea of freshman expenditures under ordinary conditions:

Application Fee	\$ 10
Tuition and Fees	750
Chemical Laboratory Deposit (for those taking chemistry)	15
Books and Supplies	75
Accident and Sickness Insurance (optional for commuters)	18
ROTC Deposit (for those electing ROTC only)	10
	<u>\$878</u>

(Engineering students should add approximately \$50.00 for drawing instruments and equipment.)

Living Expenses Per Ten-Week Term for a Freshman Residing in a University Dormitory

Room Rent	}	\$240
and Board			

Students should allow an additional amount for clothing, incidentals and personal expenses. This amount will vary with individual tastes and spending habits.

Refunds

The University provides all instruction and accommodations on an academic term basis; therefore, **no refunds are granted except in cases where students are compelled to withdraw on account of personal illness or for other reasons beyond their control.** A student must complete an official withdrawal application before a refund can be considered. Questions regarding refunds should be discussed with the Dean of Students.

Financial Aid

SCHOLARSHIPS FOR FRESHMEN

Students interested in applying for freshman scholarships and loans may obtain detailed information from:

Kenneth W. Ballou
Chairman, Freshman Scholarship Committee
Associate Director of Admissions

Alumni Scholarships

Four full-tuition scholarships for an entering freshman in each of the Basic Colleges are awarded annually by the Northeastern University Alumni Association through the generosity of donors' gifts to the Alumni Fund.

Applications are open to graduating high school seniors showing evidence of scholastic achievement and financial need.

An equal amount of scholarship assistance is granted by the Alumni Association to students enrolled in University College.

Henry B. Alvord Memorial Scholarship in Civil Engineering

Established in 1940 in memory of the late Henry B. Alvord, Professor of Civil Engineering and Chairman of the Department for eighteen years, the award is made annually to a student graduating from an accredited secondary school who demonstrates superior academic ability and gives promise of succeeding in civil engineering. The grant of \$250 is made only to an entering freshman who is qualified for and plans to study civil engineering.

Armstrong Rubber Company Scholarships

Established in 1960, the Armstrong Rubber Company of West Haven, Connecticut, offers annually a scholarship in the amount of \$1,800 to a qualified boy or girl admitted to the University for a full-time program of study.

Although children of Armstrong Company employees are given preference, any student residing in New Haven County is eligible to apply.

Recipients of the scholarship will participate in the University's Co-operative Program and will be expected to spend at least four periods of student employment with the firm. Scholarship applications are available from the Company upon request and should be returned to the Personnel Office no later than April 30 of the year in which the student plans to enter the University.

Board of Educational Assistance Scholarships

This program was established in 1957 by the Commonwealth of Massachusetts to provide scholarship aid to Massachusetts students pursuing full-time day schedules in accredited collegiate institutions. Awards are made in the fall of each year, and applications for freshmen are available through their high school guidance counselors.

General Motors Scholarships

General Motors has a vital interest in higher education in America. Under its "College Plan," one four-year, full-time scholarship is granted to a high school senior of high ability who has been admitted to one of Northeastern's Basic Colleges.

Under its "National Plan," high school seniors of exceptional promise who contemplate entering Northeastern are eligible to write the competitive examination of the Educational Testing Service, Princeton, New Jersey. Winners are awarded four-year scholarships for study in the fields of their choice. Full particulars concerning these scholarships may be obtained from a high school guidance counselor.

Charles Hayden Memorial Scholarships

The Charles Hayden Foundation, created by the will of the late Charles Hayden, an alumnus of the Boston English High School, offers annually memorial scholarships to freshmen at Northeastern University. The scholarships are awarded to "deserving boys" whose parents are unable to finance the entire cost of their education.

Massachusetts Scholarship Foundation

The Massachusetts Scholarship Foundation is a private, nonprofit organization, established in 1957 by a charter from the General Court acting on the request of Governor Furcolo. The Foundation exists to help Massachusetts students finance higher education.

Awards are made to residents of Massachusetts who are entering the freshman year at Massachusetts colleges and junior colleges, and are reserved for those students with severe financial need who will not receive from other sources sufficient help to enable them to meet their college expenses.

Awards are made for one year only and range in amount from \$200 to \$800, depending on college costs and the student's financial circumstances.

Applications must be initiated by the secondary school from which the student is graduated or the college to which the student is admitted as a freshman. Students seeking assistance should consult their high school guidance counselor or the scholarship officer at the college of their choice.

Regional Scholarships

Secondary school students who do not reside within normal commuting distance of Northeastern University, who have demonstrated superior achievement in their studies, and who are strongly endorsed by their principals and guidance officers, may qualify for a Regional Scholarship. Scholarships range in amount from \$800 to \$1,200. Recipients are required to live in University-sponsored residence halls.

Scholarships for Women

In addition to the Trustee awards, certain special scholarships are available each year for young women entering the freshman class. These scholarships are awarded to well-qualified coeds who expect to enter the College of Liberal Arts, Education, Business Administration, or Engineering. High scholastic standing, evidence of leadership ability, and financial need are important considerations.

The Northeastern Faculty Wives Scholarship. Each year the Faculty Wives Club of Northeastern University offers a half-tuition scholarship to a young woman of limited financial resources who has demonstrated a likelihood of succeeding in her chosen professional field.

The Threadwell Scholarships

Since 1953 the Sheffield Corporation of Dayton, Ohio, has offered a number of Northeastern University scholarships annually to employees of the Company and its subsidiaries, sons and daughters of employees, and high school seniors residing in Franklin County, Massachusetts. Each scholarship is in the amount of \$1,200. Recipients are expected to complete at least three work periods with the Threadwell Tap and Die Company in Greenfield, Massachusetts.

The purpose of the Threadwell Scholarships is to provide an opportunity for young men and women to further their education in the fields of Mechanical and Industrial Engineering and to train them for positions in the precision tool and gage manufacturing industry.

Trustee Scholarships

Established in 1928 by the Board of Trustees of Northeastern University, these full- and partial-tuition scholarships are granted in the four Basic Colleges each year to entering freshmen who have demonstrated superior scholastic attainment throughout their preparatory or high school course.

LOANS FOR FRESHMEN

National Defense Student Loan Program

Any student in good standing who can demonstrate financial need is eligible to apply to the Northeastern Director of Financial Aid, for assistance under the National Defense Student Loan Program. Recipients of the loans are selected by the University. The law requires that each borrower be a full-time student, in need of the amount of the loan, and capable of maintaining a good standing in his chosen course of study.

A student may borrow up to \$1,000 in one year, and a maximum of \$5,000 during his entire college career. Special consideration is given to superior students in the Colleges of Education and Engineering, and to science, mathematics, and foreign language majors in the College of Liberal Arts.

Loans to students who plan to teach in elementary and secondary schools after graduation will be canceled up to a maximum of 50 per cent at the rate of 10 per cent for each year of such teaching. No interest is charged on loans until one year after graduation. Thereafter interest is paid at the rate of 3 per cent per year. Borrowers may have up to 10 years to repay.

The New England Society Student Loaning Fund

The purpose of this revolving Student Loaning Fund, established by the New England Society, is to make available to deserving students, especially those of New England birth or ancestry, small amounts of money as temporary loans to meet emergencies.

It is not intended to be used for large loans to cover scholarships, board, or room rent, or for loans which will be outstanding more than one year.

Scholarships and Awards for Upperclassmen

Upperclassmen showing evidence of financial need may apply for scholarship assistance in the Office of the Director of Financial Aid for Students.

University awards, however, are determined by scholastic and citizenship achievement, are presented by appropriate committees headed by the Dean of Students, and do not require a demonstration of financial need.

SCHOLARSHIPS FOR UPPERCLASSMEN

The Henry Francis Barrows Scholarships

Established in 1949, the four Henry Francis Barrows Scholarships of \$250 each, provided under the will of Fanny B. Reed, are offered to Protestant young men, born and brought up in New England. Good scholastic standing, good character, and need must be demonstrated by recipients of the scholarships.

The Mr. and Mrs. Emil Matthew Bauer Fund

The interest from the Fund, established in 1954, is used for scholarships or other financial assistance to students of German birth or of German extraction studying at Northeastern University. The scholarships are available to either men or women students enrolled in any year at the University.

Blonder-Tongue Foundation Scholarship Award

The Blonder-Tongue Foundation, supported by Blonder-Tongue Laboratories, Incorporated, established in 1957 an annual scholarship of \$250. This scholarship is awarded to a junior or senior student in recognition of high scholastic attainment and demonstration of outstanding potential in the field of electronics.

The character and financial need of the student shall be considered in determining the recipient each year. Other factors being equal, preference shall be given to a member of the senior class. This scholarship award is made during the latter half of the academic year by the Dean of Students with the advice and counsel of the Department of Electrical Engineering.

Board of Educational Assistance Scholarships

This program was established in 1957 by the Commonwealth of Massachusetts to provide scholarship aid to Massachusetts students pursuing full-time day schedules in accredited colleges. Awards are made in the fall of each year, and applications for upperclass students are available during May in the Office of the Director of Financial Aid for Students.

Boston Society of Civil Engineers Scholarship in Memory of Desmond FitzGerald

In 1931 the Boston Society of Civil Engineers established a scholarship in memory of Desmond FitzGerald, a former president of the Society and an eminent hydraulic engineer with a distinguished record of service.

It has been awarded annually since 1931 to an outstanding Northeastern University senior or junior student in the Department of Civil Engineering of the College of Engineering. The presentation is made by the President of the Boston Society of Civil Engineers at the Society's annual meeting in the spring of the year.

Gardner A. Caverly Scholarship Fund

This fund was established in 1957. Qualified students are selected in the following order of preference:

1. A son or daughter of an employee of the Rutland, Vermont, Railroad Corporation.

2. A graduate of the Rutland, Vermont, High School.
3. A boy or girl who is a graduate of the Laconia, New Hampshire, High School.
4. A boy or girl from any such secondary school as Mr. Caverly might care to designate during his lifetime.

Should there be no candidate available with the above qualifications, the scholarship shall be awarded to any worthy student from the New England area.

Chemical Club of New England

To promote interest in the chemistry or chemical engineering field in New England, the Chemical Club of New England has made generous scholarships available to junior and senior students who are majoring in chemistry or chemical engineering and who show promise of success in either field.

Recipients of these scholarships must be residents of New England and must have financial need, above-average grades, and a good co-operative work record.

Electrical Manufacturers Representatives Club of New England Inc., Scholarship

Established in 1958, this scholarship of \$475 is granted to a student or students majoring in electrical engineering, without regard to race, creed, or color. To qualify, students must have real financial need and excellent scholastic standing.

Clara and Joseph F. Ford Scholarship

In 1947 friends and employees of Clara and Joseph F. Ford united to provide tuition scholarships for worthy, needy, and well-qualified students who have demonstrated a democratic and tolerant spirit and who are well disposed toward people of all creeds and races.

Hartford Life Insurance Company Scholarship

The scholarship was established in 1956 by the Hartford Life Insurance Company as an incentive for students majoring in mathematics who are interested in the possibility of a career in the actuarial field. This scholarship, which may amount to as much as \$500, is given annually to an outstanding young man or woman, judged on the basis of scholastic achievement, leadership potential, financial need, and career objective. The amount of the grant is determined by the Committee on Scholarships of the University.

Avrom Aaron Leve Memorial Scholarship

This scholarship fund was established in 1957 in memory of Dr. Avrom Aaron Leve, former Assistant Professor of Psychology. The interest is used annually to provide scholarships for upperclass students majoring in psychology. The award is made on the basis of academic achievement, financial need, and character.

Richard H. Lufkin Fund

This fund was established at Northeastern in 1960 under the will of the late Elizabeth A. Lufkin in memory of her brother. Numerous annual scholarships are made available to students majoring in electrical or mechanical engineering. In order to qualify an applicant must demonstrate a good academic record and show real financial need.

The New England Paper Merchants, Inc., Scholarship

Established in 1959 by the New England Paper Merchants Association, Inc., this is an annual scholarship awarded to a junior or senior who has demonstrated by his co-operative work achievement and his extracurricular activities, an interest and potential in the field of sales. The recipient shall also be a student who has financial need, a good academic record, and high character.

J. R. Rosen Scholarship

Established in 1958, this scholarship of \$400 is granted to a student or students in the College of Engineering, Business Administration, Liberal Arts, or Education, with due regard for need and capacity to profit by attendance at college, but without restrictions as to race, creed, or geographic origin.

Frank B. Sanborn Scholarship Fund

The Frank B. Sanborn Scholarship Fund was established in 1958 to provide a scholarship or scholarships of not more than \$500 to worthy and needy students selected by the University, without restrictions as to race, creed, or geographic origin, but with preference being given to students majoring in electrical, mechanical, civil, or industrial engineering, in the order stated.

Each recipient must be willing to assume a moral obligation to reimburse the fund as he may be able, in order to make similar financial aid available for other students in later years. There shall be no interest charged and no time specified for reimbursement.

William Lincoln Smith Scholarship Fund

The fund was established in 1947 by Farnham Wheeler Smith, Class of 1924, Benjamin Lincoln Smith, Class of 1923, Thomas Hollis, Jr., Class of 1941, and other members of the family in honor of Dr. William Lincoln

Smith, who served long, faithfully, and with distinction as Chairman of the Department of Electrical Engineering at Northeastern University.

The income from the fund is used for an annual scholarship award to a student enrolled in the Department of Electrical Engineering who has demonstrated excellence in some aspect of electrical research, stands high in his courses, or otherwise exhibits promise of future competence in the field. The award shall preferably be granted to a student who needs financial assistance to continue his college work.

Samuel Ulman Scholarship Fund

This fund was established in 1960 by Mrs. Samuel Ulman in memory of Samuel Ulman, a student at Northeastern University from 1912 to 1915. The purpose of the fund is to provide scholarship assistance to students who have financial need and good scholastic standing.

United States Rubber Company Foundation Scholarships

The United States Rubber Company Foundation has established scholarships to be awarded to students in the Colleges of Engineering, Business Administration, and Liberal Arts who qualify on the basis of leadership and character, academic performance and potential, need for financial assistance, and demonstration of interest in a career in industry.

Recipients assume a moral obligation to repay at least 25 per cent of any scholarship received to the University Scholarship Fund after graduation. Students must have completed at least two years of their undergraduate program to be eligible.

University Scholarships

Northeastern University has for many years maintained a scholarship fund for deserving, qualified students. These scholarships are awarded on the basis of need, scholastic standing, and campus citizenship. The recipient of a Northeastern scholarship must be willing to assume a moral obligation to repay the University at some future date.

Henry E. Warren Scholarships

Established in 1958 by the Warren Benevolent Fund, Inc. The purpose of these scholarships is to encourage students to gain co-operative work experience reinforcing study in their major field.

Scholarship awards in the total amount of \$1,000 are awarded annually without restrictions as to race, creed, or national origin, to upperclass students in fields in which related co-operative work positions are few or poorly paid. The recipients of the scholarship must have demonstrated good scholastic standing, fine character, and financial need.

Western Electric Scholarship Award

This scholarship, established in 1956, is awarded annually to an upper-class student in Mechanical, Electrical, or Industrial Engineering. The recipient must be an outstanding student who also has financial need. The Western Electric Company is the manufacturing company for the Bell Telephone System.

ROTC Scholarships and Awards

Scholarship awards totaling \$1,000 are available to ROTC cadets each year. The University offers nine \$50 scholarships annually. They are: one to the outstanding freshman cadet, four to sophomores (one in each branch and division), two to middlers (one to each branch), and two to juniors (one to each branch).

Scabbard and Blade (the cadet officers' honorary society) offers four \$125 scholarships annually to middlers. The Pershing Rifles (the basic course honorary society) offers a \$50 scholarship to a sophomore Pershing Rifles cadet.

Academic Achievement Awards are won by each cadet in the top 10 per cent of ROTC classes. This award, an embroidered wreath, is worn on the right sleeve of the uniform during the year immediately following. Leadership Achievement Awards, consisting of letters of commendation, are awarded to each cadet in the top 10 per cent in leadership potential.

Many medals and trophies are also awarded by other organizations to ROTC cadets for achievement in diverse fields.

The Academy Award

The Academy, the honor society of the College of Liberal Arts, offers annually a scholarship of \$100 to the sophomore in the College of Liberal Arts who, during the previous year as a freshman, made the highest scholastic record.

William J. Alcott Memorial Award

This award was established in 1934 by members of the faculty and other friends to perpetuate the memory of William Jefferson Alcott, Jr., a brilliant member of the Northeastern Department of Mathematics from 1924 until his death in 1933. The award, made annually from the income of the fund, is for outstanding scholastic achievement during the preceding year, either in a particular field of interest or for a superior academic record.

Alumni Awards for Professional Promise

Established in 1947 by the Alumni Association, these awards are presented annually at a final senior class meeting in the spring of the year. The awards are made to the outstanding seniors in each of the four Basic Colleges who

have demonstrated unusual professional promise through their character traits, scholastic achievement, and co-operative work performance.

Sears B. Condit Honor Awards

These awards were established in 1940 through the generosity of Sears B. Condit. In the fall of the year at a University convocation, Sears B. Condit Honor Awards, not less than twenty in number, are awarded annually to outstanding students in the senior class of the College of Liberal Arts, the College of Education, the College of Business Administration, and the College of Engineering. Each award carries a stipend of not less than \$100 as well as a certificate of achievement.

The Harold D. Hodgkinson Achievement Award

Established in 1954, the Harold D. Hodgkinson Achievement Award of \$400 is granted annually to a junior student for his senior year. The winner of the award is known as the Hodgkinson Scholar for the year in which he is chosen.

The award is based primarily upon distinguished scholastic achievement with due consideration of character, personality, qualities of leadership, co-operative work experience, military record, if any, and service in voluntary organizations and activities. Student leadership accomplishments and professional potential are evaluated in connection with these criteria.

Other qualifications being equal, a relative of the donor or a candidate connected with Filene's by co-operative work or relationship is given preference. The Hodgkinson Scholar is chosen by a committee of administrative members of the faculty. An appropriate certificate is presented to the recipient as a permanent record of his selection.

Kappa Iota Epsilon Award

Kappa Iota Epsilon, the College of Education honor society, offers an annual award of \$100 to the Education sophomore who, during the freshman year, achieved the highest scholastic record.

Julia and Merrill Robert Lovinger Award

This annual \$100 award was established in 1960 by William Lovinger for the purpose of giving assistance to a student who has financial need and acceptable scholastic standing.

Harold A. Mock Award

Established in 1959 by Harold A. Mock, a distinguished alumnus of the University, this annual award of \$200 is made to an outstanding member of the junior class in the College of Business Administration. The Committee on scholarships selects the recipient on the basis of high academic standing and co-operative work achievement, participation in University extracurricular activities, personality, and character.

Ruth E. Phalen Memorial Award Fund

This fund was established in 1959 by Thomas E. Phalen, Jr., a member of the faculty, in memory of his wife. The income from this fund is used yearly as a cash award to a senior, junior, or middler, preferably in the College of Engineering, who maintains at least a 2.0 academic average, shows outstanding ability in one or more varsity sports, and demonstrates excellent campus citizenship.

Roland Guyer Porter Memorial Fund

This fund was established in 1953 by colleagues and friends of the late Professor Roland G. Porter, for many years head of the Department of Electrical Engineering. Interest from the fund provides an annual award to a student in the Department of Electrical Engineering who best exemplifies the qualities of mind and character which Professor Porter did so much to develop in his lifetime.

President's Awards

Since 1929, at the annual Dean's List Dinner in both Divisions, four scholarships of \$100 each, known as the President's Awards, have been presented to the students with the outstanding records in the sophomore, middler, junior, and senior classes. The scholarships are accompanied by a congratulatory letter from the President.

The Sigma Society Award

The Sigma Society, the honorary society of the College of Business Administration, offers an annual scholarship of \$100 to the sophomore in the College of Business Administration who, during the previous year as a freshman, made the highest scholastic record.

Tau Beta Pi Award

Massachusetts Epsilon Chapter of Tau Beta Pi Association, national honorary society in engineering, offers annually a scholarship of \$100 to the sophomore in the College of Engineering who, during the previous year as a freshman, made the highest scholastic record.

Woman of the Year Award

The women's societies of the University sponsor an annual scholarship of \$100 to the senior woman student who, by high scholastic attainment and by demonstration of the quality of leadership, has proven herself the outstanding woman student of the year.

LOAN FUNDS

Higher Education Loan Plan (HELP)

The Massachusetts Higher Education Assistance Corporation was chartered in 1956 by the Massachusetts legislature to aid young men and women of the state to complete their programs of higher education. Students who are residents of Massachusetts and who have satisfactorily completed the freshman year, are eligible for HELP loans. Loans are generally limited to \$500 in any one academic year, with an over-all limitation of \$1,500.

Full information and the required application forms may be obtained from any of the 129 national banks and trust companies in Massachusetts participating in the program.

National Defense Student Loan Program

New England Society Student Loaning Fund

(For a description of these two loan funds, see page 40.)

University Long-Term Loan Fund

Northeastern maintains a loan fund for the purpose of aiding students in meeting their tuition expenses from term to term.

This fund is in many ways similar to the National Defense Loan Fund. Money borrowed need not be repaid until after graduation; and interest, at the rate of 3 per cent, does not become effective until one year after that time.

Students who qualify for this assistance may borrow as much as full tuition for any given term.

Student Activities

Northeastern University regards student activities as an integral part of its educational program. The Student Activities Office is charged with the responsibility of co-ordinating the various types of activities and of administering the social, musical, literary, and athletic organizations in such a way as to enable each to contribute in a wholesome, worthwhile manner to student life at Northeastern. Every student is encouraged to participate in such activities as may appeal to him.

Members of the faculty also are interested in extracurricular activities. A faculty adviser is appointed for each student organization. His function is to encourage the students in the development of their programs, and to give them the benefit of his experience and mature point of view in integrating these programs with other important phases of college life.

One of the outstanding contributions of the Co-operative Plan in the field of higher education has been its capacity to develop in students those powers of social understanding that are so essential to success in professional life. At Northeastern the program of student activities is made to contribute to this end in a very real way. It is a conscious aim of the student activities advisers to develop among their advisees those qualities of personality and character which will enhance their usefulness as future business or professional men and as citizens.

Students have splendid opportunities to develop administrative and executive ability as leaders of undergraduate organizations. No academic credit is awarded for any student activity. This has been no deterrent, however, to student participation in extracurricular activities, for a substantial majority of the undergraduate body participates annually in one or more forms of student activity.

Athletics

The University maintains both varsity and freshman teams in baseball, basketball, cross-country, football, hockey, and track. Games and meets are arranged with many eastern colleges. A well-rounded program of intramural sports is available for men students and a program of intramural sports and dance is offered to women students. The girls also play basketball with girls from other colleges in the Boston area.

Athletic policies for the University are determined by the Faculty Committee on Student Activities. This committee determines the eligibility of students to participate in athletics, approves the various sports schedules, and approves awards of letters and numerals to qualified athletes.

Honor Societies

Nine honorary societies are chartered in the Colleges:

Tau Beta Pi, in the College of Engineering (Massachusetts Epsilon Chapter).

Eta Kappa Nu, in the Department of Electrical Engineering (Gamma Beta Chapter).

Pi Tau Sigma, in the Department of Mechanical Engineering (Northeastern Tau Kappa Chapter).

Phi Alpha Theta, in the College of Liberal Arts, History Department (Northeastern Zeta Tau Chapter).

Pi Sigma Alpha, in the College of Liberal Arts, Government Department (Northeastern Delta Gamma Chapter).

Alpha Pi Mu, in the College of Engineering, Industrial Engineering.

Kappa Iota Epsilon, in the College of Education.

The Sigma Society, in the College of Business Administration.

The Academy, in the College of Liberal Arts.

Election to the college honorary societies is based primarily upon scholarship but, before a man or woman is privileged to wear the honorary society insignia, there must be evidence of an integrity of character and an interest in the extracurricular life of the University as well as a pleasing personality. The societies have memberships consisting of the outstanding men and women in the colleges. Election to an honorary society is the highest honor that can be conferred upon an undergraduate.

Publications

The News—A college newspaper, the *Northeastern News*, is published each week throughout the college year by a staff selected from the student body. The copy is prepared, edited, and published by the students themselves with the counsel of a faculty adviser. Opportunity is afforded for the students to express their opinions on subjects relating to study, co-operative work, social events, and topics of the day. Positions on the News staff and promotions are attained by competitive work. The paper is in part supported by advertising, both national and local, and in part by a portion of the student activities fees. The *Northeastern News* is a member of the Eastern Intercollegiate Newspaper Association and sends one of its editors to the annual convention of this association each year. Copies of the News are mailed to upperclassmen when they are on co-operative work and to freshmen after the close of their college year.

The NU Writer—A literary magazine whose editors select for publication the best examples of creative writing submitted by the student body.

The Cauldron—The combined senior class publishes annually a college yearbook, *The Cauldron*. It is distributed without charge to the seniors and contains a complete review of the college year with class histories, pictures of all seniors, of the faculty, and of undergraduate groups, as well as a miscellany of snapshots and drawings contributed by students.

Student Council

Student government of the Colleges at Northeastern University is vested in the Student Council, composed of elected representatives from the various classes. The Council is the authority on all matters relating to student policies not definitely connected with classroom procedure. It has jurisdiction, subject

to faculty approval, over all such matters as customs, privileges, and campus regulations.

Student Union

The purpose of the Northeastern Student Union is to deepen the spiritual lives of Northeastern men and women through the building of character, to create and promote a strong and effective Northeastern University spirit in and through a unified student body, to promote sociability, and to emphasize certain ethical, social, civic, intellectual, and avocational values.

All students are encouraged to participate in the activities of the Union, no matter what their religious faith, as the work of the Union is entirely nonsectarian.

The Chapel Committee assists the Dean of Chapel and Director of Music in conducting the voluntary and interfaith services held on Wednesdays from 8:20 a.m. to 8:45 a.m. in the Bacon Memorial Chapel. This committee also has charge of special chapel programs at the Christmas and Easter seasons.

Clubs

To assist in the promotion of social, cultural, and intellectual advancement through informal channels, many clubs are sponsored. The following partial list is given to indicate the variety of opportunities available.

Art Club- This group is open to all Northeastern students interested in sketching or painting. Weekly meetings are organized to provide instruction and guidance in pencil and charcoal sketching, water coloring, and oil painting. The regular program includes several field trips for practice in sketching or painting seascapes and landscapes. Several exhibitions of the work of members are held during the year.

Auto Club- Members conduct special programs for sports car and antique auto enthusiasts.

Biology Club- The Biology Club (Nu-Beta) serves to stimulate interest in the biological sciences by presentations of motion picture films and lectures, and participation in field trips. Membership is open to all students.

Debating Society- The purpose of the Debating Society is "to foster and promote an interest and facility in formal argumentation; to develop an impartial, unbiased, and intellectual consideration of questions and issues of current interest; and to sponsor intercollegiate relationships and competition in the debating field." Membership is open to all students of the colleges.

Husky Key- This organization for the promotion of school spirit provides special services at athletic events and for visiting teams and other groups.

Hus-Skiers and Outing Club - The purpose of the Hus-Skiers and Outing Club is to conduct an integrated program of ski activity and week-end outings. A tournament and carnival are held near the close of the winter season, in which all members are eligible to take part. The Club holds charter membership in the New England Intercollegiate Ski Conference. Skiing is recognized as a minor sport.

International Relations Club - Founded for the purpose of studying and discussing those current national and international events and issues which vitally concern our American life and institutions, the Club maintains contacts with similar organizations in other colleges.

Jazz Society - This group is primarily interested in contemporary American music and sponsors festivals, small "live" concerts, speakers, and sessions for listening to recent recordings.

Mathematics Club - Members discuss topics of mathematical interest which are either outside or beyond the scope of the regular mathematics courses.

Military Affiliated Radio System (MARS) - A world-wide organization of amateur radio operators sponsored by the U.S. Army Signal Corps. It operates station AAIWAS at Northeastern University. Membership is open to all "ham" operators who have or desire to obtain amateur licenses. It co-operates with the Radio Club.

Musical Clubs - The Office of Student Activities sponsors musical clubs such as the following: concert orchestra, band, chorus, and dance orchestra, for which all students with musical ability are eligible. Membership in the various musical clubs is attained by competitive effort.

Politics Club - This club provides students with opportunities to become better acquainted with current political issues and to hear outstanding speakers from the national and state political organizations.

Psychology Society - An organization in which interests in technical psychology are pursued. The membership is open principally to majors in the field of psychology, but this does not preclude from participation any student who has an active interest in the subject.

Radio Club - One of the most popular undergraduate activities is the Radio Club. Members are provided opportunity for code practice and are encouraged to obtain their amateur licenses. The Club owns and operates station W1KBN, a short-wave transmitter, located in the Radio Laboratory in the penthouse of Hayden Hall. Meetings are held about once a month for the discussion of technical matters. Practicing radio engineers are frequently invited to address the club at evening meetings, when students in both Divisions may attend.

Rifle Club-Recognized as a minor sport, the Club offers opportunities for intercollegiate competition on the varsity level, as well as intramural matches for various club teams. ROTC cadets participate in Army area matches and the women's rifle team in National Rifle Association competition.

Silver Masque-This dramatic club affords an opportunity for those students interested in dramatics to participate in the production of several productions in the course of the college year. Qualification for the cast and for positions on the business staff is through competition under the direction of the faculty adviser.

Sociology Society-This organization provides an opportunity for sociology majors, as well as interested students from other fields, to join with faculty members of the department to explore matters of common interest that pertain to the field.

Table Tennis Club-For those interested in table tennis. Games are played weekly and tournaments held periodically.

University Band-Open to all students with musical ability, it performs at University events such as convocations, football, basketball, and hockey games, and at parades and ROTC reviews.

Women's Societies-The social activities for women are centered in two societies, Omega Sigma and Gamma Delta. Each society has its own program of banquets, teas, informal parties, general meetings, and social service projects. The societies co-sponsor activities such as a mid-winter dance. One of the primary objectives of the societies is to offer the women students at Northeastern University opportunity for closer friendship, for spirited participation in wholesome activity, and for leadership development.

Yacht Club-The Yacht Club is a member of the Intercollegiate Yacht Racing Association. The club participates in regattas held in the Charles River Basin and also at other colleges. Sailing is recognized as a minor sport.

Professional Societies

The purpose of student chapters of national professional societies is to provide an interchange of information on technical subjects, new developments, and professional standards. The chapters at Northeastern hold regular meetings and social affairs, and send representatives and delegations to outside meetings.

The following professional societies are open to upperclassmen in the respective professional fields:

Accounting Society-All students interested in accounting are invited to become members of this club. Problems involving accounting are presented and discussed at club meetings. Upperclassmen present problems arising out of thesis

or co-operative work experience, and able practitioners from the professional world are invited to present papers and lead the student discussions.

Advertising Club - Affiliated with the Junior Advertising Club of Boston and with the National Industrial Advertisers' Association through the Technical Advertising Association of Boston. Members of this club are committed to the development of professional associations and interests.

American Chemical Society - Membership is open to upperclassmen majoring in chemistry or chemical engineering. Meetings are held twice during each term, at which times talks and motion pictures are given on various chemical subjects.

American Finance Association - The purpose of this society is to increase knowledge of the investment field by providing opportunities for discussions and by arranging for supplementary talks by outstanding personalities in the professional world of finance. All interested students are welcome at the meetings, which are held regularly during each ten-week term.

American Institute of Physics - Membership is open to all students having physics as one of their primary interests. Meetings are held regularly. The program consists of student and guest speakers, demonstrations, films, and tours through local centers of research.

American Marketing Association - Students in the College of Business Administration maintain this chapter for the purpose of enhancing the professional development of its members. Meetings are held each ten-week period, at which executives from Greater Boston firms discuss current issues in the field.

Armed Forces Communications and Electronics Association (AFCEA) - This is a national professional society composed of the leaders of industry and of the departments of the Armed Forces concerned with communications, electronics, and photography. It is sponsored by the Signal Corps branch of ROTC. Membership is open to any student who is interested in communications, electronics, and photography. They take many field trips and have prominent speakers at regular meetings.

Engineering Societies, National - Students in the several professional curricula of the College of Engineering operate Northeastern University sections of the appropriate national professional societies. Chief among these are the following:

- American Society of Civil Engineers
- Boston Society of Civil Engineers
- American Society of Mechanical Engineers
- American Institute of Electrical Engineers
- American Institute of Chemical Engineers
- American Institute of Industrial Engineers
- Institute of Radio Engineers
- Society of Women Engineers

Members of the engineering faculty who hold membership in the parent organizations serve as advisers to these student groups. Meetings are held regularly, and practicing engineers are invited to address the sections. Occasionally appropriate motion pictures are shown, or the group visits some current engineering project in the vicinity of Boston. The College of Engineering encourages these student sections of the technical societies in the belief that they provide a wholesome medium for social intercourse as well as a worthwhile introduction to professional life.

National Education Association-A professional association for college students actively preparing to teach. Its aim is to provide experiences which help develop professional awareness and competency and assist in guiding students into proper areas of specialization.

Society for the Advancement of Management-The purposes of this professional society are to stimulate student interest in the profession of management and to present to the student a picture of management problems and functions through lectures, plant visitations, group discussions, and the like. Membership is open to all upperclassmen interested in the profession of management. The N. U. Student Chapter is sponsored by the Boston Chapter of S.A.M.

Society of American Military Engineers (SAME)-This is a national professional society composed of civilian industrial leaders and officers of the Armed Forces concerned with military and industrial construction and military engineering. Membership is open to all engineering students. It is sponsored by the Corps of Engineers branch of ROTC. They take many field trips and have prominent speakers at regular meetings.

ROTC Honorary Societies

Pershing Rifles-This is an honorary society open to ROTC freshmen and sophomore cadets who distinguish themselves. The national society was founded in 1894 at the University of Nebraska and now has about 130 chapters at colleges and universities throughout the country. Company A, 12th Regiment, at Northeastern University was chartered in 1952. It encourages, promotes, and develops citizenship and the highest ideals of the military profession. The Rifles have a crack drill team that participates at University and local civil ceremonies.

Scabbard and Blade-This is the ROTC cadet officers' honorary society. The National Society was founded in 1905 at the University of Wisconsin, and there now are over 128 chapters at colleges and universities throughout the United States. Company H, 11th Regiment, at Northeastern was chartered in 1954. Membership is restricted to advanced course cadets and is by invitation only. Scabbard and Blade is a most important ROTC student activity. It sponsors the Annual Military Ball.

Class Organization and Activity

Each of the classes in the Basic Colleges elects its officers and carries on activities as a class. Dances are sponsored by the classes at regular periods throughout the year. One of the highlights of the social program is the Junior Promenade, held each spring at one of the Boston hotels.

Senior Week is the culmination of five years of class activities. Informal dances, beach outings, a moonlight cruise, and the formal Senior Promenade are held during the week prior to Commencement.

Convocations

These meetings are usually held in Symphony Hall. There is a President's Convocation for Freshmen during the Orientation Period. Meetings for the entire University, known as the Fall Convocation and the Honors Convocation, are held during the year on Wednesdays from 12 to 1, and bring before the student body some of the ablest and foremost leaders of our country. Attendance is compulsory. Other convocations may be announced during the year. These meetings are under the direction of the Dean of Students Office.

Nonsectarian Chapel Services

The period from 8:20 a.m. to 8:45 a.m. on Wednesdays throughout the year is reserved by the University for nonsectarian chapel services. Northeastern was founded upon inclusive and broad religious principles, and spiritual values are regarded as indispensable to good citizenship. Attendance at chapel services is therefore encouraged though not required.

The Bacon Memorial Chapel is located in the Ell Student Center. Adjoining it the Dean of Chapel has his office, where he is available to all students upon appointment.

For over three decades eminent leaders of religion - ministers, priests, and rabbis alike - have participated in this interfaith service. A chapel choir is led by the director of music, and students of various religious backgrounds assist in the order of worship.

The Northeastern chapel program enjoys the distinction of having recognition through charter membership in the National Association of College and University Chaplains.

Fraternities

Ten local Greek letter fraternities are currently chartered by Northeastern University. Each fraternity is provided with a faculty adviser who is responsible for the proper administration of the fraternity house under the rules and regulations established by the faculty. The list of fraternities in the order of their establishment is as follows:

- | | | |
|-----------------------|--------------------|--------------------|
| 1. Beta Gamma Epsilon | 4. Sigma Kappa Psi | 8. Kappa Zeta Phi |
| 2. Alpha Kappa Sigma | 5. Phi Beta Alpha | 9. Gamma Phi Kappa |
| 3. Nu Epsilon Zeta | 6. Phi Gamma Pi | 10. Phi Alpha Rho |
| | 7. Sigma Phi Alpha | |

Elected representatives from each fraternity make up an Inter-Fraternity Council, a body which has preliminary jurisdiction over fraternity regulations. Its rulings are subject to the approval of the Faculty Committee on Student Activities.

Reserve Officers' Training Corps

General Objectives

The Department of Military Science is the instructional department of the Colleges which administers the Reserve Officers' Training Corps Program (ROTC). The Reserve Officers' Training Corps is regarded by Northeastern University as an integral part of its educational program, and the aim is to make ROTC available on a voluntary basis to all male undergraduate students of the Colleges who are otherwise qualified. The University believes that the leadership, citizenship, and military training available to students taking ROTC is beneficial in their over-all development as future leaders and, therefore, encourages enrollment. The courses outlined in this section, accordingly, are available to students in all Colleges of the University.

The Reserve Officers' Training Corps of the United States Army exists for the purpose of developing officers—leaders of men. It offers courses of instruction leading to a commission as a second lieutenant in the United States Army Reserve or the Regular Army. The mission of ROTC is to have ready in time of national emergency a corps of educated, trained leaders for our nation. The Northeastern ROTC is an Army, Senior Division, Class CC (Civilian College) unit with branches in the Corps of Engineers and Signal Corps. Enrollment in ROTC is entirely voluntary.

The greatest benefit to the individual from ROTC training is its development of leadership qualities. Leadership—the ability to organize and direct the activities of others—is in high demand by business, industry, the social fields, the military service—almost all human enterprises.

Although the Department of Military Science is an instructional department of the Colleges, it is also interested in many extracurricula student activities as part of its over-all leadership development program. There exists, therefore, close association with the Department of Student Activities, and activities associated with ROTC (listed under "Professional Societies" and "Clubs") have Army officers assigned by the University as Faculty Advisers.

Also, ROTC students who gain positions of leadership on the campus in activities not directly associated with ROTC, such as publications, dramatics, athletics, and student government, have thereby displayed leadership achievements which are valuable in ROTC training and which can be recognized in ROTC leadership potential ratings. The over-all progress of a student in the University, as well as his military progress, is always considered in ROTC training.

Among the ROTC activities, the Annual Military Ball is one of the most colorful campus events of the year. The Fall Awards Ceremony in honor of the University President, at which he presents ROTC scholarships, and the Spring Awards Ceremony, at which Distinguished Military Student badges and other awards are presented by University officials and representatives of donor societies, also are colorful events open to the entire "University Family."

The staff and faculty of the Department of Military Science consist of officers, noncommissioned officers, and civilians, assigned to Northeastern University by the Department of the Army, and of civilians furnished by the University. All military members are especially selected because of professional competence, educational background, and ability to fit into the "University Family." Officers are individually nominated for assignment to the University and are assigned only after records have been reviewed and each individually has been accepted by the University.

The Department Chairman and Professor of Military Science is a United States Army officer whose appointment has been mutually agreed upon by the University President and the Department of the Army.

Courses of Study

The program of instruction consists of a basic course and an advanced course, presented in two branches of the United States Army, Corps of Engineers and Signal Corps. Only Army ROTC is available at Northeastern. The basic course (MS I & MS II) requires three hours of instruction per week during the freshman year and four hours during the sophomore year. The Corps of Engineers limits its ROTC to students enrolled in engineering courses, but the Signal Corps, while especially desiring electrical and other engineering students, also accepts nontechnical students for ROTC. There are many command, administrative, personnel, business management, and other position openings in the Signal Corps for nontechnical college graduates.

At Northeastern, students majoring in civil, mechanical, and industrial engineering are enrolled for Corps of Engineers instruction, while those majoring in electrical and chemical engineering and all nonengineering majors in the Colleges of Business Administration, Education, and Liberal Arts are enrolled for Signal Corps instruction.

The basic course includes instruction common to all branches of the Army. Students completing the basic course are awarded a "Military Training Certificate" as evidence of successful completion of this course. This certificate indicates one's patriotic accomplishments and has positive value in many ways. Branch instruction starts with the advanced course for Corps of Engineers or Signal Corps. The advanced course (MS III & MS IV) is presented during the middler, junior, and senior years. Graduates of the advanced course receive commissions as second lieutenants in the U.S. Army Reserve or Regular Army.

Enrollment in Basic Course

Enrollment in ROTC basic course is voluntary and is open to all male undergraduate students of the Basic Colleges who are citizens of the United States, are physically qualified, and who can qualify for appointment as second lieutenant prior to reaching 28 years of age. The basic course may be entered only at the beginning of the freshman year, except for veterans, for whom some or all of the basic course may be waived.

Eligibility for the Advanced Course

The ROTC advanced course is available to male undergraduate students of the Basic Colleges who complete the basic course, or to honorably discharged veterans whose service can be substituted for the basic course, who: are citizens of the United States and will not have reached 28 years of age at the time of commissioning; successfully complete such survey and general screening tests as may be prescribed; have three academic years to complete for graduation (two for full time); are selected by the Professor of Military Science and the University within quotas available in any year; execute a written contract with the Government; and successfully complete a U.S. Army physical examination.

Eligibility for ROTC Flight Training

Northeastern University was among the original group of universities and colleges in the United States at which the Army ROTC Flight Training Program was introduced in 1956. This training is available during the senior year to specially selected cadets who successfully complete U.S. Army Aviator aptitude and physical tests. Flying instruction is conducted on an extracurricular basis by civilian flying schools, under contract to the University and the U.S. Army. An Army Aviator faculty member supervises the program. Cadets successfully completing the course receive a Federal Aviation Agency Private Pilot's certificate.

Veterans

Honorably discharged veterans (enlisted) may be enrolled in ROTC with one or both years of the basic course waived, depending on prior service. They must be co-aligned in ROTC with other members of their class in the University curricula. Veterans are a distinct benefit to the Corps of Cadets because their actual experiences lend color to the program and help to orient cadets without such service. They are especially desired and are appointed cadet noncommissioned officers or officers upon enrollment. Certain credits are available to veterans depending upon service. Former commissioned officer veterans are not eligible for ROTC. However, if they are reserve officers, they can earn inactive duty credits by participating in ROTC on a free-time basis. They may apply to the Professor of Military Science

Transfer Students

Students transferring into Northeastern University from other institutions where ROTC similar to that at Northeastern has been taken, are allowed credits for their work. The student's former records are obtained from his former Professor of Military Science. Such transfer students must be co-aligned in ROTC with other students in their classes.

Uniforms and Equipment

An Army officer's type uniform is issued without costs to ROTC students in the basic course. Advanced-course students are individually fitted to a uniform,

which becomes their personal property upon commissioning, and they continue to wear it as an officer after graduation. The Government furnishes \$100 towards this uniform, and the student pays a small additional charge. All other equipment, textbooks, etc., required for instruction is provided without charge throughout the five-year program. These items remain the property of the Government, and the students must safeguard them and use them in accordance with University and ROTC regulations. A \$10 deposit is required temporarily from all basic-course students enrolling in ROTC until uniforms and property are returned in good condition. Any loss or damage to ROTC uniforms and equipment, exceeding the deposit, will be charged to the student.

Academic Credit

Academic credit is given for all ROTC work – a total of 24 hours during five years. The basic course may be substituted for physical education as a prerequisite for graduation. Eighteen credit hours are granted for the advanced course, and certain of these may be substituted for upperclass academic work as approved by the Dean up to a maximum of 12 credits. Thus, time spent in the advanced course is not all over and above the regular curriculum. Many of the credit hours can be substituted for other elective academic work.

Pay and Other Benefits

ROTC benefits are both tangible and intangible. "Pay," earned by advanced-course students, is actually a nontaxable allowance for subsistence at the rate of \$.90 daily. It is paid in increments of \$27 monthly during actual advanced-course instruction and also during co-operative work terms up to a total of 595 days. Camp pay is \$78 monthly over and above housing, messing, and medical care, which are free at camp. Transportation to and from camp is paid at the rate of \$.05 per mile. Total income from ROTC amounts to over \$700 paid over the final three years of ROTC. This (over \$2 per hour for the 300 hours of the advanced course) is an important supplement to co-operative work income in offsetting tuition costs. Cadets also compete for ROTC scholarships with a total value of \$1,000.

Intangible benefits, especially leadership development, are even more important than "pay" in the long run. The ROTC student is trained to be confident and self-reliant. He becomes a cadet officer as he enters the advanced course in his middler year. For the final three years he gets a concentrated course in command, leadership, and personality development under Regular Army officers who have been selected for their abilities in this respect. Cadets respond quickly to this personalized training. They learn to stand up before classmates and to talk. This helps them to obtain positions of leadership on the campus, in the community, or at their places of business.

As cadets progress, they participate in troop command and management, in public speaking, in exercises requiring understanding of practical and applied psychology, and in other similar fields for the development of leadership and personality. Each year brings increased responsibilities. In the senior year, cadets are promoted to positions of high leadership in the Corps of Cadets. They command the brigades, regiments, battalions, companies, and platoons, or serve in Cadet Grades from First Lieutenant to Brigadier-General. Top leaders in ROTC usually are top leaders on the campus.

There are many social activities and benefits associated with ROTC. Cadets are eligible for selection to honorary military societies such as Pershing Rifles and Scabbard and Blade. ROTC students compete for medals and other academic and leadership awards. They associate with many other cadets in the University ROTC Band, the University Rifle Club (Varsity, Freshman, Girls' and ROTC Rifle teams), the Military Affiliate Radio System for "ham" radio operators, student chapters of national professional societies sponsored by the Armed Services, such as the Armed Forces Communications and Electronics Association, and the Society of American Military Engineers, and in military news movies.

Draft Deferments

Public Law 51 (Universal Military Training and Selective Service Act of 1951 as amended by the Reserve Forces Act of 1955) permits students enrolled in ROTC, who are expected to attain appointments as commissioned officers in the Army Reserve, to be deferred from service for as long as they remain in good standing. ROTC deferment remains in effect until graduation or withdrawal from the University. An ROTC deferment is a matter of law and is not dependent upon conditions pertaining in any one Selective Service Board at any one time.

Distinguished Military Students

There are military honors for ROTC graduates similar to academic honors for regular graduates. Honor graduates of ROTC are called Distinguished Military Graduates. If physically qualified and they apply for it, they can be commissioned in the Regular Army, instead of the Army Reserve, and enter into a Regular Army career exactly the same as graduates of the United States Military Academy at West Point. This is a splendid opportunity for those who are interested in the many advantages of a Regular Army career. However, since ROTC is primarily for students who pursue civilian careers, the Distinguished Military Graduate who does not desire a Regular Army career benefits from his Commencement military honors as he would from any other Commencement honors. This honor is limited to about 15% of the senior class.

Cadets are eligible to be designated Distinguished Military Students in their junior year, when they possess outstanding qualities of leadership, high moral character, and definite aptitude for the military service; have attained an academic standing in the upper half of the class and in the upper third of their ROTC class, and, further, have demonstrated leadership ability through achievements while participating in recognized campus activities. Such cadets, who maintain creditable standing up to graduation, are designated Distinguished Military Graduates.

The Army as a Career

By following any curricula leading to a degree, and by completing the ROTC Program, a student may qualify for a full-time career in the Regular Army. Cadets who have been designated Distinguished Military Students

may apply in September of the senior year for an appointment in the Regular Army. They are notified by mid-December as to selection subject to graduation, designation as Distinguished Military Graduates, and physical qualification. They then become Regular Army officers, with all conditions and opportunities for graduate education, etc., exactly the same as for graduates of the U.S. Military Academy at West Point. There are many advantages and opportunities in a Regular Army career. Pay and allowances compare favorably with civilian pay, and the retirement pay and benefits, after 30 years, are much higher than for most other careers. Since it is never too early to begin planning a career, students who are interested in a Regular Army appointment should make that fact known to the Professor of Military Science as soon as possible.

An Army career as a Reserve officer on extended Active Duty also is possible. Many graduates do not request a Regular Army appointment originally, but find Army service enjoyable and satisfying while serving their obligated tours of Active Duty. Those officers who request continuation and are accepted, serve in the Active Army as Reserve officers, with the same pay responsibilities, and opportunities for promotion as Regular Army officers.

Most ROTC graduates pursue civilian careers and serve only limited tours of Active Duty. However they, too, can benefit from their part-time Army careers by participating in Reserve Unit training activities during evenings and at summer camp. They receive pay and accrue credit towards retirement at age 60 (after 20 years' service). Such part-time careers may result in eligibility for retired pay each month for the rest of their lives. This is a real financial security benefit, which is equivalent to a sizable annuity and is worthwhile for any person to seek.

Curriculum in Basic ROTC

FIRST YEAR											
Term 1			Term 2			Term 3					
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
1-01	Mil. Sci. I Mil. Fund. & Drill			61-02	Mil. Sci. I Am. Mil. Hist. Weap. & Marksman.	2	1	61-03	Mil. Sci. I Am. Mil. Hist. Weap. & Marksman. Drill	2	1
			1(2)	1							(1)

Curriculum in Signal Corps Advanced ROTC

THIRD YEAR											
Term 7 ^a				Term 8				Term 9			
1-20	Mil. Sci. III Intro. Leadership	2	0	61-21	Mil. Sci. III Commun. Syst. Eng. Leadership Lab.	3	3 (2)	61-22	Mil. Sci. III Commun. Material Field Commun. Eng.	1	1 2(1) 2
$\overline{2} \overline{0}$				$\overline{3(2)} \overline{3}$				$\overline{3(1)} \overline{3}$			
FOURTH YEAR											
Term 10 ^a				Term 11				Term 12			
1-30	Mil. Sci. III Pictorial Activ.	2	0	61-31	Mil. Sci. III Command & Intell. Mil. Teach. Methods Leadership Lab.	1	1 2 2 (2)	61-32	Mil. Sci. IV Mil. Admin Logistics Auto. Data Proc.	1(1) 2 1 1 1	
$\overline{2} \overline{0}$				$\overline{3(2)} \overline{3}$				$\overline{3(1)} \overline{3}$			
FIFTH YEAR											
Term 13 ^a				Term 14				Term 15			
1-40	Mil. Sci. IV Mil. Law	3	0	61-41	Mil. Sci. IV Commun. Syst. Eng. Leadership Lab.	3	3 (2)	61-42	Mil. Sci. IV Operations U.S. & World Aff. Service Orient. Leadership Lab.	2	2 1 1 (1)
$\overline{3} \overline{0}$				$\overline{3(2)} \overline{3}$				$\overline{3(1)} \overline{3}$			

Curriculum in Corps of Engineers Advanced ROTC

THIRD YEAR											
Term 7 ^a				Term 8				Term 9			
60	Mil. Sci. III Intro. Leadership	2	0	61-61	Mil. Sci. III Mil. Teach. Meth. Field Fortif. Leadership Lab.	2 1 (2)	2 1	61-62	Mil. Sci. III Mine Warfare Mil. Struct.	1 3	1 2
$\overline{2} \overline{0}$				$\overline{3(2)} \overline{3}$				$\overline{4} \overline{3}$			
FOURTH YEAR											
Term 10 ^a				Term 11				Term 12			
70	Mil. Sci. III Mil. Explosives	2	0	61-71	Mil. Sci. III Log. & Mil. Constr. Leadership Lab.	3 (2)	3	61-72	Mil. Sci. IV Mil. Admin. Eng. Comp. & Constr. Mgt.	1 3	1 2
$\overline{2} \overline{0}$				$\overline{3(2)} \overline{3}$				$\overline{4} \overline{3}$			
FIFTH YEAR											
Term 13 ^a				Term 14				Term 15			
80	Mil. Sci. IV Staff Procedures	3	0	61-81	Mil. Sci. IV Mil. Law Constr. Mgt. & Bldgs. & Util. Leadership Lab.	2 1 (2)	2 1	61-82	Mil. Sci. IV Oper. of Eng. Units U.S. & World Aff. Leadership Lab.	2 1 (1)	2 1
$\overline{3} \overline{0}$				$\overline{3(2)} \overline{3}$				$\overline{3(1)} \overline{3}$			

NOTE: Div. A curriculum is listed. Div. B differs with a spring rather than fall drill term and sequence of instruction in 10-week terms is reverse of Div. A. Therefore, transfers between Divisions require individual consideration.

Summer term - 5 weeks. () indicate drill and practice.

General Information

Policy on Changes of Program

The University reserves the right to withdraw, modify, or add to the courses offered or to change the order or content of courses in any curriculum.

The University further reserves the right to change the requirements for graduation, tuition, and fees charged, and other regulations. However, no change in tuition and fees at any time shall become effective until the school year following that in which it is announced.

Any changes which may be made from time to time pursuant to the above policy shall be applicable to all students in the school, college, or department concerned, including former students who may re-enroll.

Textbooks and Supplies

The Northeastern University Bookstore, located on the ground floor of Richards Hall, is a department of the University and is operated for the convenience of the student body. All books and supplies which are required by the students for their work in the University may be purchased at the Bookstore.

Part-Time Work

Students who find it necessary to accept part-time jobs while attending college may obtain such work through the Dean of Students Office.

Students are not justified in assuming that the University will take care of their expenses or guarantee to supply them with work sufficient to meet all their needs.

A student should have funds adequate to meet the expenses of the freshman year. They should amount to at least the first year's tuition plus books and supplies, room and board for thirty weeks.

Grades and Examinations

Examinations

Examinations covering the work of the term are usually held at the close of each term. Exceptions may be made in certain courses where, in the opinion of the instructor, and with the approval of the Dean of the College concerned, final examinations are not necessary.

Conditional Examinations

Conditional examinations are usually given once each year for each Division. The charge is three dollars (\$3) for each condition examination.

The responsibility for the removal of a condition rests with the student, who is required to ascertain when and how the condition can be removed.

A student may take only one conditional examination to remove a failure in a given course.

Special Final Examinations

Students who have been given permission to make up missed final examinations will be charged a single fee of five dollars (\$5) covering all of the examinations missed within a given final examination period during a given period of illness.

Senior Conditional Examinations

No conditional examinations in last-term senior courses are offered at the end of the last term. This means that a failure in a last-term senior course cannot be made up before Commencement.

Grades

A student's grade is officially recorded by letter, as follows:

- A outstanding attainment
- B above-average attainment
- C average attainment
- D poor attainment, lowest passing grade
- F failure, removable by condition examination (students are permitted to take only one condition examination in a given course)
- I incomplete, used for intermediate grades only to signify that the student has not had time to make up work lost through excusable enforced absence from class
- L used in all cases of the removal of a failure by condition examination
- WP Withdrew from course – passing
- WF Withdrew from course – failing

Students who acquire more than three uncleared failures or whose weighted average for the year is below 1.4 will not be permitted to register for advanced work.

The responsibility for the removal of a condition rests with the student, who is required to ascertain when and how the condition can be removed.

Dean's List

A Dean's List, issued at the end of each term, contains the names of upper-class students who have a 3.0 weighted average in all subjects with no grade below C during the preceding period. Freshmen who meet the same standards in their work are included on a Freshman Honor List. No student subject to disciplinary action is eligible for either list.

Reports on Scholastic Standing

Reports for all students are issued at the end of each grading period. Questions relative to grades are to be discussed with the student's faculty adviser.

Students are constantly encouraged to maintain an acceptable quality of college work. Parents and students are always welcomed by the college officers and faculty advisers for conference upon such matters.

Parents or guardians will be notified whenever students are advised or required to withdraw from the University. If parents so request, report cards will be sent to them instead of to the student.

General Conduct

Conduct

It is assumed that students come to the University for a serious purpose and that they will cheerfully conform to such regulations as may from time to time be made. Damage to any building or to any of the furniture, apparatus, or other property of the University, will be charged to the student or students known to be immediately concerned; but if the persons who caused the damage are unknown, the cost for repairs may be assessed equally upon all the students of the University.

Students are expected to observe the accepted rules of decorum, to obey the regulations of the University, and to pay due respect to its officers. Conduct inconsistent with the general good order of the University or persistent neglect of work may be followed by dismissal; if the offense be a less serious one, the student may be placed upon probation. The student so placed upon probation may be dismissed if guilty of any further offense.

It is desired to administer the discipline of the University so as to maintain a high standard of integrity and a scrupulous regard for truth. The attempt of any student to present any work which is not his or her own, or to pass any examination by improper means, is regarded as a most serious offense and renders the offender liable to immediate expulsion. The aiding and abetting of a student in any dishonesty is also held to be a grave breach of discipline.

Attendance

Students are expected to attend all exercises in the subjects they are studying unless excused in advance.

No cuts are allowed. A careful record of each student's attendance upon class exercises is kept. Absence from regularly scheduled exercises in any subject will seriously affect the standing of the student. It may cause the removal of the subject or subjects from the student's schedule.

Laboratory work can be made up only when it is possible to do so during hours of regularly scheduled instruction.

Absences from exercises immediately preceding or following a recess are especially serious and may entail severe penalties.

Attendance at all mass meetings of the student body is compulsory. Exceptions to this rule are made only when the student has received permission from the Director of Student Activities previous to the meeting in question.

Attendance at Commencement

All candidates for a first degree (bachelor or associate) are required to attend Commencement in the year of qualification. First degrees in absentia are awarded only to candidates excused for personal or immediate-family illness, military service, or employment obligations beyond the control of the candidate.

A petition to receive a degree in absentia must be presented to the Dean of the College in which the candidate qualifies. Each petition will be acted upon by the academic Dean involved, the candidate having the privilege of appeal to the Provost.

Freshman Counseling

Freshman Orientation Period

In order that freshmen may be ready to pursue their academic work with greater composure and be somewhat acclimated before the beginning of scholastic work, three or four days prior to the first term are devoted to a freshman orientation period. All freshmen are required to attend all exercises at the University scheduled during the orientation period.

Freshman Orientation Class

All freshmen attend an orientation class once each week for the first fifteen weeks. This class is designed to instruct the student in the traditions, activities, and procedures of the University. Time is devoted to the proper methods of study for success in college and stress is placed on attitudes for success in later life. About a third of the classes are devoted to techniques and procedures of work under the Co-operative Plan.

Physical Examination

All freshmen receive a physical examination at the University during the orientation period. All students are expected to report promptly at the appointed time for examination. Those who fail to appear at the appointed time will be charged a special examination fee of two dollars (\$2).

Freshman Counselors

At the time of matriculation each freshman is assigned to a personal adviser, a member of the faculty, who serves as an interested and friendly counselor during the perplexing period of transition from school to college. The aim of the freshman advisory system is primarily to guide students through their first year. General counseling is under the direction of the Dean of Freshmen and the Dean of Students, assisted by a clinical psychologist, who handles the diagnosis and remedial treatment of difficult problem cases. Direct counseling of women students is under the supervision of the Dean of Women.

Individual Attention to Freshmen

Attention is given not only to the scholastic problems of the student, but also to personal problems in which advice is needed and desired. The aim is to help the student to the fullest possible personal development.

The college records of all students are periodically analyzed in the light of what may reasonably be expected from them in view of their previous school record, their scores on psychological tests, and all other factors in their situations. If they are not doing their best work, investigations are made to determine and eliminate the causes.

Testing and Counseling Center

The University through its Testing and Counseling Center is prepared to provide guidance for students who are uncertain about their educational objectives. This service is available without charge to all regularly enrolled students who desire such assistance. Students seeking help should apply through the Dean of Students Office.

Vocational counseling services are also available on a fee basis to high school students by referral from the Department of Admissions or by direct communication with the Testing and Counseling Center. Adults wishing vocational guidance are also served by this Center on a fee basis.

Occupational Information Service

The Occupational Information Service is equipped to provide information about various fields of work and about the educational requirements for these fields. Students may browse through books and pamphlets or may listen to tape recordings on various occupations. Of special interest are the recordings which describe life and activities at Northeastern, as well as others which present information about the various programs of study available at Northeastern.

Student Housing

The University maintains dormitory facilities for both men and women students. These are located near the Huntington Avenue campus, but they accommodate only a portion of the men students who live away from home. The residences for women students are sufficient to provide for all girls who need such accommodations while they are at the University.

Women's Residence

A women's residence, under the supervision of house directors, is maintained by the University. Board (including three meals a day) and room is \$240 per ten-week term.

Women students who do not live with their parents or a legal guardian while attending college are required to live in the University residence unless

written approval of other arrangements has been obtained in advance from the Dean of Women. Such approval will be granted only in unusual circumstances. Permission to live in apartments or unsupervised rooming houses will be granted only to students who have reached the age of twenty-three.

During co-operative work periods students who cannot live at home or in the University residence make special living plans through the Department of Co-operative Education. If the situation requires that the student live in an unsupervised residence, written approval from parents or guardian must be on file with that department.

Information regarding the women's residence may be obtained from the Dean of Women.

Freshman Men's Residences

The University is able to provide living accommodations for a limited number of freshmen in its dormitories. The cost is \$240 for each ten-week term, payable at the beginning of the term, and includes three meals each day. Applications for housing may be filed with the Department of Admissions after a student has been accepted. Definite notice of room reservations will be sent by the Dean of Freshmen in June, at which time a dormitory deposit of fifty dollars (\$50) will be required. (This is nonrefundable and will be applied against the first term's board-and-room charges.)

Students should write to the Dean of Admissions for further information and for the Application for Residence.

Fraternity Housing

Certain fraternities provide excellent opportunities for room and board for men at reasonable rates. Information regarding these housing facilities may be obtained from the Dean of Students Office.

Regulations Concerning Rooming Houses

Inasmuch as some men students who are living away from home cannot be cared for in the present University dormitories or fraternity houses, the Dean of Students Office is charged with the responsibility of assisting such students to find suitable rooms in the vicinity of the University campus. The following rules and regulations apply to such arrangements:

1. A list of rooming houses which have been inspected and approved for use by Northeastern University students is maintained by the Dean of Students Office. General information as to price, type of room, and location, can be obtained in advance of registration, and the student may visit several possible rooms before making his decision.
2. First-year students who cannot be housed in the Freshman Men's Residence must live in a residence inspected and approved by the Uni-

versity, unless they furnish the Dean of Students with a statement from their parents permitting them to live elsewhere.

3. If a student has rented a room obtained through the assistance of the Dean of Students Office, he must notify the Registrar of his local address.
4. Although the University does not encourage students to rent apartments, it is recognized that this living arrangement is acceptable to many parents. The rental of apartments by groups of students will therefore be approved for upperclassmen only under the following conditions:
 - (a) Upperclassmen over 21 years of age may rent apartments if they have an approved request filed in the Dean of Students Office.
 - (b) Upperclassmen under 21 years of age may rent apartments only after they have a written consent from their parents filed with the approved request in the Dean of Students Office.
5. The University is concerned to know the conditions under which students away from home are living and to provide landladies with necessary information about University regulations and about reporting students who may need medical care. It is the responsibility of every student to keep the Registrar's Office informed at all times as to his residence while he is enrolled at the University.

THE COLLEGE OF LIBERAL ARTS

Aims

In providing the means to a modern liberal education, the College of Liberal Arts of Northeastern University has a threefold objective: first, intellectual growth; second, the development of a well-rounded personality; and third, preparation for a vocation.

Intellectual growth rests upon the foundation of a sound general education. Through the required and elective courses of all curricula, students are guided toward an understanding of the leading ideas, significant facts, and the habits of thought and methods of work in the areas of language, natural science, social science, and the humanities. With this training the student will appreciate more fully the basic values upon which civilization and culture rest, and perceive and accept his responsibilities as an active participant in social groups—the family, the community, the nation, and the world. At the same time the student is aided in the development of a resourceful and independent mind and the ability to use as well as to accumulate knowledge; and he becomes aware of his mental strengths and weaknesses.

The College of Liberal Arts endeavors to assist each student in attaining the goal of an emotionally balanced, well-rounded personality. Its academic, extracurricular, and co-operative work programs provide experiences con-

ducive to the development of strength of character and a sense of personal responsibility—including such personal qualities as self-reliance, integrity, perseverance, and the ability to work with others.

Since liberal arts colleges were originally established for the purpose of training for certain professions, the College of Liberal Arts holds that there is no inconsistency between a truly liberal education and preparation for a vocation. Today it is widely accepted that a liberal education must prepare both for the art of living and the obtaining of a living. Through its academic program coupled with co-operative work experience, the College of Liberal Arts offers young men and women a sound training either for further graduate study or for immediate entrance upon graduation into some vocation.

Methods

To enable each student to plan a college program in keeping with his own interests and aptitudes, a wide range of electives is offered. This does not mean that students are free to elect courses indiscriminately, for if they are to obtain a liberal education they must have training in several basic fields. Therefore, a definite series of basic courses in each curriculum is required by the faculty. These required courses are largely concentrated in the first two years of the curriculum.

Through a comprehensive guidance program students are directed in their selection of courses so that they obtain the proper preparation for their intended vocations. Specialization in a major field is emphasized during the latter part of the curriculum and is facilitated by the opportunity for electing certain courses in the other Basic Colleges of the University.

Through the Northeastern plan of co-operative education for upperclassmen, the student makes early contact with actual working conditions and profits by the wholesome experience of earning at least part of the money to defray college expenses. Viewed as a whole, then, the college years surround the student not with an artificial atmosphere of cloistered scholarship but with an environment very close to that which he or she will enter after graduation, and thus tend to make for more ready employment, an essential element of vocational competence.

Evening Programs

To serve men and women who are engaged in full-time employment during the day, the College offers a number of its courses during evening hours, constituting a program leading to the Bachelor of Arts degree with curricula in economics, English, history, government, and sociology. Courses offered are noted at the end of each departmental listing.

Preparation for a Career

The curricula in the College of Liberal Arts afford not only a broad cultural training but also the necessary foundation for a wide range of vocations for both young men and young women. Some of the career opportunities open to the graduates of the College of Liberal Arts, together with the academic programs needed, are indicated below and in the pages which follow.

Art—The courses in art provide a liberal education in the history of art, and train men and women for professional work in industrial drafting and tracing, advertising design, commercial art, or teaching, dependent upon the nature of the elected program. An appreciation of art is developed through progressive courses in art history which include studies of materials, techniques, and methods used by master craftsmen. Paralleling these academic studies, courses in applied art provide adequate training for employment in engineering drafting rooms or commercial art studios.

Business—The value of a liberal arts preparation for a business career is clearly shown by the fact that a very large proportion of all graduates of liberal arts colleges enter business. Within recent years there has arisen an increasing demand for liberal arts graduates by the largest and most progressive corporations in the country. For their training programs in manufacturing, merchandising, selling, and other fields, many companies are seeking adaptable young men and women with the breadth of background of a liberal arts education.

Students planning either to go to a graduate school of business administration or to enter business directly upon graduation should major in Economics and should elect courses in English, government, and psychology. A limited number of specialized courses in the College of Business Administration such as advertising, business law, finance, industrial management, insurance, investments, marketing, and merchandising may be taken by students who have had the necessary prerequisites.

Biological Sciences—Students who major in biology can arrange programs which will lay the foundation for the following careers: teaching, dentistry, medicine (see premedical curriculum), veterinary medicine, public health, sanitation and laboratory methods; research in biology with universities, private research institutions, and governmental agencies under state and federal control; agriculture; and professional work in zoology and its applied fields, such as fisheries, animal husbandry, and biology survey. Graduate study is essential for most of these careers.

Chemistry—The subject matter of the chemistry curriculum is composed of four broad fields: inorganic chemistry, analytical chemistry, organic chemistry, and physical chemistry. Chemists are employed in research, development, production, sales, market research, purchasing, and teaching. Women chemists find openings in some of these fields as well as in medical research and as technical librarians. Students who choose a chemistry major at Northeastern, a program accredited by the American Chemical Society, will be prepared to enter these fields upon graduation.

The same program provides a thorough foundation for those who wish to continue in graduate studies for a higher degree.

Dentistry—The minimum requirement for admission to dental schools is two years of preliminary study in an approved college. Since the requirements of individual dental schools vary, students should familiarize themselves with the specific requirements of the schools in which they are interested. For most dental

schools a candidate for admission must offer at least one year of work in English, physics, and biology, and one and one-half years of work in chemistry, including organic chemistry.

Predental students at Northeastern will be able to meet these requirements by taking the two-year predental program. A third year may be taken by those students who desire to obtain a broader educational background, and who wish to qualify for the Bachelor of Science degree under the combined program described on page 78.

Government Service—Government service is a very comprehensive term since the numerous activities of modern government require all types of trained workers. For more and more of these positions a college education is essential as shown by the fact that only college graduates are eligible to take many civil service examinations in such fields as biology, business analysis, economics, editing, fiscal analysis, mathematics, physics, psychology, social work, sociology, and statistics.

The distinctive governmental career field is that of public administration since the need for college-trained personnel in administrative governmental posts of all types, political or nonpolitical, is being increasingly recognized. While graduate training is desirable, an undergraduate program with a major in history or government and a minor in economics will provide the necessary foundation for a career in government service at home or abroad.

For career opportunities in the United States Army see page 61.

Journalism—Many of the nation's leading editors now advise students preparing for a career in journalism to obtain a broad liberal arts education rather than to concentrate on specific training in the routines of journalism in their undergraduate programs. It should be observed that opportunities in journalism today are not restricted to the urban or rural newspaper fields. Publishing houses, trade journals, house organs, advertising departments and agencies, radio and television studios, and the various types of public relations work need college graduates with the same basic training.

Students who desire to enter journalism should choose the English-journalism major with a minor in economics, history, or government. They may elect courses in advertising in the College of Business Administration.

Law—Approved law schools now require at least three years of acceptable college work for admission. Since admission requirements of law schools vary, all prelegal students should ascertain the specific requirements of the law school of their choice.

The prelegal curriculum listed on page 89 will prepare a student for admission to any law school requiring three years of college work. Under the combined program described on page 78 it is possible for most students to obtain both the Bachelor of Arts and Bachelor of Laws degrees in six years.

Library Work—Professional training for library work now demands at least one year of graduate study in a library school following a broad undergraduate foundation. Although many students planning on this field major in English, excellent opportunities are available for students who have majored in any area.

Mathematics - A recent bulletin of the United States Department of Labor lists the following occupational titles in fields other than teaching for those who have majored in mathematics: actuarial statistician, actuary, computer, mathematical aide, mathematical assistant, mathematician, statistical clerk, and statistician. Opportunities for such positions are to be found in government service, insurance companies, and industry. A rapidly developing new field for mathematics majors is programming for digital and other types of modern computers and data-processing devices. For advanced types of mathematical work graduate study is necessary.

Medical Technology - Beginning September 1960 in affiliation with such hospitals as the New England Deaconess and New England Baptist, Northeastern University will offer a curriculum in Medical Technology on the Co-operative Plan leading to the bachelor's degree. Students spread their hospital training over their co-operative work periods, and through hospital scholarships and part-time work in the hospitals are able to cover a large proportion of their college expenses.

Students are eligible to take the examination for certification as a Medical Technologist (M.T.) by the Registry of Medical Technologists of the American Society of Clinical Pathologists.

Medicine - In order to be eligible for admission to a medical school according to the Committee on Education of the American Medical Association, a candidate must have attended an approved college and have included certain specific work in his program. The minimum course requirements include year courses in each of the following fields: English, inorganic chemistry, organic chemistry, physics, and a foreign language. Since some medical schools impose additional requirements, premedical students should obtain full information from the medical school of their choice about the courses which must be offered for admission.

The premedical curriculum listed on page 90 will enable students to meet all the above standard requirements. The electives make it possible to obtain any particular additional courses required by some medical schools.

Students are cautioned that the successful completion of the required premedical program by no means insures admission to a medical school. Since most medical schools have far more applicants than they can admit, standards of selection are most rigorous and take into consideration not only the quality of the applicant's academic record and instructor's recommendations but also his or her medical-aptitude-test score and the results of a personal interview.

Premedical students should note the combined program described on page 78.

Ministry - Preparation for the ministry today requires a theological school training following graduation from an approved college of liberal arts. The American Association of Theological Schools states that the appropriate foundation for a minister's later professional studies lies in a broad and comprehensive college education and that the normal place for a minister's professional study is the theological school. Recommended fields of study include

English, economics, education, government, history, foreign languages, one of the natural sciences, philosophy, psychology, and sociology.

While students who major in English, economics, psychology, or sociology will be able to arrange programs meeting the above recommendation, it is urged that preministerial students obtain counsel from the dean of the theological school of their choice since some schools have further specific requirements.

Modern Languages-A major in Modern Languages is available for those students who have obtained a strong foundation in one language (French, German, or Spanish) in high school and begin a second one in the freshman year at college.

Besides secondary school teaching, there are other fields, such as certain branches of government service, international business relations, journalism, and library science, in which a knowledge of foreign languages is either required or desirable.

Physics-As a result of the rapid developments in physics in recent years, there are increasing opportunities in applied physics on the technical staffs and in the research laboratories of the electrical, electronics, missile, radio, optical industries, and in many government research agencies for the liberal arts graduate who has majored in physics. Graduate study is necessary for those who plan on research in pure physics.

Psychology-A wide variety of career opportunities exists for persons trained in psychology. Many psychologists are engaged in teaching at the university and junior college level. In the field of public school education, the demand is expanding for school psychologists, and for guidance and vocational counselors. Increasing numbers of psychologists are employed in business and industry in such areas as marketing research, advertising, personnel work, and employee selection. State and federal hospitals, as well as child guidance clinics, employ large numbers of psychologists who deal with the diagnosis and treatment of the emotionally ill. Many psychologists are engaged in full-time research, studying various aspects of human behavior.

It should be noted that most of these positions require that the applicant have academic training beyond the undergraduate level, and a large number require that he have the Ph.D. degree. Those who aspire to a career in psychology should view their undergraduate work as preparatory for advanced study in the area. The student who does not expect to obtain graduate training will find, in an undergraduate concentration in psychology, an opportunity to obtain a well-balanced education, as well as an increased understanding of his own and others' behavior.

Secretarial Work-Today there are excellent opportunities for college graduates, regardless of their majors, who can qualify for secretarial positions. A sequence of elective courses in secretarial studies is open to all students in the College of Liberal Arts who wish to prepare themselves for this avenue to advancement.

Sociology - Sociology majors find their undergraduate training of value, and are increasingly in demand in such important and interesting fields of work as college teaching, social work, social research projects, personnel work in business and industry, and government positions in a wide range of areas.

For those desiring to do further work in the first three fields, graduate training for at least one or two years is almost always required. For other fields of work, however, little or no graduate training is necessary.

Statistical Work - The growing emphasis upon statistics in business, education, social service, and government has opened a new career field for the student who majors in mathematics and prepares in statistics. Similar training is necessary for students who wish to enter the actuarial field.

Teaching (Secondary School) - While a major in education is not offered in the College of Liberal Arts, a minor in this field is available from courses offered by the College of Education, which meets the requirements of the Department of Education of the Commonwealth of Massachusetts for teachers in secondary schools. Students from other states should familiarize themselves with the requirements of their own state, as these requirements are constantly being increased.

Most small secondary schools, in which the graduate must begin, expect teachers to be able to teach at least two, and often three, subjects. Consequently programs should provide for the common combinations of related subjects. A major should be selected from the following fields: biology, chemistry, English, history, government, modern languages, or mathematics-physics. Qualified seniors will be able to do supervised student teaching in lieu of co-operative work.

Students who desire to become teacher-coaches may minor in physical education, provided they elect the required courses in education.

Teaching (College) - Students who plan to enter the college teaching profession will find that each of the major programs affords an excellent preparation for graduate study in the leading universities of the country. Since graduate schools usually require a reading knowledge of French or German, frequently both, students should elect adequate work in these languages. Seminar and research courses are strongly recommended for their training in research techniques.

Admission Requirements

Applicants for admission to the freshman class must qualify by graduation from an approved course of study in an accredited secondary school, including prescribed subjects listed on page 30.

Graduation Requirements

Degrees

The College of Liberal Arts awards the Bachelor of Arts degree to qualified

candidates who have majored in economics, English, English-journalism, government, history, modern languages, psychology, or sociology.

The Bachelor of Science degree is awarded to qualified candidates who have majored in biology, chemistry, mathematics, physics, or have taken the pre-medical curriculum.

Quantity Requirements

Candidates for a degree must have completed one of the curricula listed on pages 79-93. Each curriculum provides for at least 48 credit hours of advanced work in a major field and at least 24 credit hours of prescribed or relative upperclass courses in a minor field.

All candidates for a degree must have satisfactorily completed in college one year of a modern foreign language above the elementary level.

Students who undertake co-operative work assignments must meet the requirements of the Department of Co-operative Education before they become eligible for their degrees.

No student transferring from another college or university is eligible to receive a degree until at least one year of academic work immediately preceding graduation has been completed at Northeastern.

Quality Requirements

An average grade of C is required for graduation.

Graduation with Honor

Candidates of distinctly superior achievement in their academic work will be graduated with honor. Upon special vote of the faculty a limited number of this group may be graduated with high honor or with highest honor. Students must have been in attendance at the University at least three years before they may become eligible for honors at graduation.

Curricular Requirements

The following fields of study are approved as major fields in the College of Liberal Arts: biology, chemistry, economics, English, English-journalism, government, history, mathematics, modern languages, physics, premedical, psychology, and sociology. In addition, programs are approved for pre dental, prelegal and medical technology students.

Students may elect their minor fields after consultation with their faculty advisers. In addition to the major fields listed above, the following subjects are available as minors: art, education, French, German, philosophy, physical education, and Spanish.

The required courses in each curriculum are indicated on the following pages. Upon petition to the faculty, substitutions may be permitted in exceptional cases when required by the specific vocational objective of the student.

During the last year students in all curricula are required to take 50-10 or 50-20 Placement Techniques, designed to prepare them for placement in specific positions in their chosen vocational field. Under expert guidance each student prepares a complete personnel record, studies himself or herself and the opportunities that are open, and works out a complete campaign for obtaining after-graduation employment. Qualified students planning to go to graduate school may be excused upon petition to the faculty.

Combined Program with Professional Schools

Students who have completed at least three quarters of the work required for the baccalaureate degree at Northeastern University before entering an approved professional school of dentistry, law, or medicine will be granted the Bachelor of Arts or Bachelor of Science degree upon receipt of the professional degree, provided at least two thirds of the work for the baccalaureate degree has been earned in residence at Northeastern and all other graduation requirements have been fulfilled. The residence requirement at Northeastern University must have been completed immediately prior to entrance into the professional school. Under this plan pre-professional students may reduce by one year the time ordinarily required for obtaining both degrees.

Four-Year Plan

Except for pre-professional programs, all curricula in the College of Liberal Arts are normally organized on the five-year Co-operative Plan, which is the distinctive feature of Northeastern University.

However, in all majors except chemistry and physics, qualified students may be excused from the Co-operative Plan by the Dean and may complete the requirements for the degree in four years.

Honors Program

An honors program is provided in the College of Liberal Arts to enable superior students to develop their potential to the highest degree by making it possible for them to pursue studies in their major fields to greater depth than is possible in the regular courses.

The nature of the program will be determined by the academic department concerned. Programs may involve any of the following elements: special research projects culminating in honor theses, honor seminars, reading projects, directed independent study, or creative work. Flexibility is the keynote, with every consideration being given to the individual needs and requirements of the student.

The program will be open to junior and senior students approved by the Faculty Honors Committee. To be eligible a student must have a grade-point average of 3.0 with no grade below B in all courses in the major field after the freshman year.

Curriculum in Biology

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
11-01	Gen. Chem.	3(3)	4	11-02	Gen. Chem.	3(3)	4	11-03	Gen. Chem.	3(3)	4
14-21	Basic Math.	3	3	14-22	Basic Math.	3	3	14-23	Basic Math.	3	3
10-01	Gen. Biol.	2(3)	3	10-02	Gen. Biol.	2(3)	3	10-03	Gen. Biol.	2(3)	3
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	3		Elective	3	3		Elective	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
51-01	ROTC (Basic)			61-02	ROTC (Basic)			61-03	ROTC (Basic)		
<hr/> <hr/> 14(6)16				<hr/> <hr/> 14(6)16				<hr/> <hr/> 14(6)16			

SECOND YEAR

Term 4 ^{ss}				Term 5				Term 6			
0-04	Gen. Biol.	3(3)	2	10-55	Comp. Anat.	3(3)	4	10-56	Comp. Anat.	3(3)	4
1-04	Gen. Chem.	3(3)	2	11-26	Org. Chem.	3(3)	4	11-27	Org. Chem.	3(3)	4
30-04	Intro. to Lit.	5	2-1/2	20-06	Ec. Prin. & Prob.	4	4	20-07	Ec. Prin. & Prob.	4	4
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	1-1/2		Elective	4	4		Elective	4	4
<hr/> <hr/> 14(6) 8				<hr/> <hr/> 14(6)16				<hr/> <hr/> 14(6)16			

THIRD YEAR

Term 7 ^{ss}				Term 8				Term 9			
	Elective	5	2-1/2	10-40	Physiology	3(3)	4	10-41	Physiology	3(3)	4
	Elective	5	2-1/2	11-28	Org. Chem.	4(3)	5	11-45	Biol. Chem.	4	4
	Elective	5	2-1/2	10-61	Embryology	3(3)	4	10-62	Embryology	3(3)	4
					Elective	4	4		Elective	4	4
<hr/> <hr/> 15 — 7-1/2				<hr/> <hr/> 14(9)17				<hr/> <hr/> 14(6)16			

FOURTH YEAR

Term 10 ^{ss}				Term 11				Term 12			
	Elective	5	2-1/2	15-11	Gen. Phys.	3(3)	5	15-12	Gen. Phys.	3(3)	5
	Elective	5	2-1/2	10-59	An. Histol.	3(3)	4	10-60	An. Histol.	3(3)	4
	Elective	5	2-1/2	11-17	Quant. Anal.	3(3)	4	11-18	Quant. Anal.	2(3)	3
					Elective	4	4		Elective	4	4
<hr/> <hr/> 15 — 7-1/2				<hr/> <hr/> 13(9)17				<hr/> <hr/> 12(9)16			

FIFTH YEAR

Term 13 ^{ss}				Term 14				Term 15			
	Elective	5	2-1/2	10-20	Gen. Bact.	3(3)	4	10-21	Gen. Bact.	3(3)	4
	Elective	5	2-1/2		Biol. Elect.	4	4		Biol. Elect.	4	4
	Elective	5	2-1/2	15-13	Gen. Phys.	3(3)	5		Elective	4	4
					Elective	4	4		Elective	4	4
				50-10	Place. Tech.	2	1				
<hr/> <hr/> 15 — 7-1/2				<hr/> <hr/> 16(6)18				<hr/> <hr/> 15(3)16			

Summer term—5 weeks. () indicate laboratory hours.

Curriculum in Chemistry

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
11-46	Gen. Chem.	3(3)	4	11-47	Gen. Chem.	3(3)	4	11-48	Gen. Chem.	3(3)	4
14-61	Math. Anal. I	5	4	14-62	Math. Anal. II	5	4	14-63	Math. Anal. III	5	5
15-51	Physics	3	3	15-52	Physics	3	3	15-53	Physics	3	3
32-01	El. German	3	3	32-02	El. German	3	3	32-03	El. German	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
61-01	ROTC (Basic)			61-02	ROTC (Basic)			61-03	ROTC (Basic)		
<u>17(3)17</u>				<u>17(3)17</u>				<u>17(3)18</u>			

SECOND YEAR

Term 4 ²²				Term 5				Term 6			
11-49	Gen. Chem.	3(3)	2	11-50	Org. Chem.	3(6)	5	11-52	Org. Chem.	3(6)	5
14-64	Math. Anal. IV	5	2-1/2	14-65	Math. Anal. V	4	4	14-66	Math. Anal. VI	4	4
15-54	Physics	5	2-1/2	15-55	Physics	4(3)	5	15-56	Physics	3(3)	4
32-04	El. German	3	1-1/2	32-15	Inter. German	4	4	32-16	Inter. German	4	4
<u>16(3) 8-1/2</u>				<u>15(9)18</u>				<u>14(9)17</u>			

THIRD YEAR

Term 7 ²²				Term 8				Term 9			
Elective		5	2-1/2	11-53	Org. Chem.	3(3)	4	11-62	Phys. Chem.	3(3)	4
Elective		5	2-1/2	11-61	Phys. Chem.	3(3)	4	15-14	Adv. Physics	0(3)	1
Elective		5	2-1/2	15-15	Adv. Physics	3(2)	4	20-12	Economics	3	3
				20-11	Economics	3	3	Elective		4	4
								or			
								11-45	Biochemistry	4	4
								11-55	Org. Chem.	3	3
<u>15 — 7-1/2</u>				<u>12(8)15</u>				<u>13(6)15</u>			

FOURTH YEAR

Term 10 ²²				Term 11				Term 12			
11-70	Quant. Anal.	5(6)	3	11-63	Phys. Chem.	3(3)	4	11-64	Phys. Chem.	3(3)	4
	Elective	5	2-1/2	11-71	Quant. Anal.	3(6)	5	11-76	Inst. Anal.	3(6)	5
	Elective	5	2-1/2	11-41	Chem. Lit.	3	3	Elective		3	3
				Elective		3	3	Elective		3	3
				or				or			
				14-07	Diff. Eq.	3	3	14-08	Diff. Eq.	3	3
<u>15(6) 8</u>				<u>12(9)15</u>				<u>15(9)18</u>			

FIFTH YEAR

Term 13 ²²				Term 14				Term 15			
Elective		5	2-1/2	11-91	Special Topics	3(3)	4	11-82	Inorg. Chem.	3	3
Elective		5	2-1/2	11-93	Nuclear Chem.	3	3	11-92	Special Topics	3	3
Elective		5	2-1/2	11-57	Qual. Org. Anal.	0(9)	3	11-58	Org. Prep.	0(9)	3
				11-81	Inorg. Chem.	3	3	29-03	Elf. Speaking	3	3
				50-10	Place. Tech.	2	1	Elective		4	4
				Elective		4	4				
<u>15 — 7-1/2</u>				<u>15(12)18</u>				<u>13(9)16</u>			

At least 28 credits of electives must be non-science.

²² Summer term—5 weeks. () indicate laboratory hours.

Curriculum in Economics

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
23-01	West. Civ.	4	4	23-02	West. Civ.	4	4	23-03	West Civ.	4	4
22-01	Am. Natl. Gov.	3	3	22-02	Am. Natl. Gov.	3	3	22-03	Am. Natl. Gov.	3	3
17-01	Surv. Phys. Sci.	3	3	17-02	Surv. Phys. Sci.	3	3	17-03	Surv. Phys. Sci.	3	3
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	3		Elective	3	3		Elective	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
61-01	ROTC (Basic)	—	—	61-02	ROTC (Basic)	—	—	61-03	ROTC (Basic)	—	—
		16	16			16	16			16	16

SECOND YEAR

Term 4 ^a				Term 5				Term 6			
17-04	Surv. Phys. Sci.	4	2	20-06	Ec. Prin. & Prob.	4	4	20-07	Ec. Prin. & Prob.	4	4
23-04	West. Civ.	4	2	25-01a	Intro. Psych.	3(3)	4	25-02a	Gen. Psych.	3(3)	4
	Mod. Lang.			26-01	Prin. Soc.	4	4	26-02	Prin. Soc.	4	4
	Elective	3	1-1/2		Mod. Lang.				Mod. Lang.		
30-04	Intro. to Lit.	5	2-1/2		Elective	4	4		Elective	4	4
		—	—			—	—			—	—
		16	8			15(3)	16			15(3)	16

THIRD YEAR

Term 7 ^a				Term 8				Term 9			
	Elective	5	2-1/2	14-44	Math. Prin.	4	4	14-45	Math. Prin.	4	4
	Elective	5	2-1/2	20-18	Am. Ec. Hist.	4	4	20-28	Ec. Systems	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		—	—			—	—			—	—
		15	7-1/2			16	16			16	16

FOURTH YEAR

Term 10 ^a				Term 11				Term 12			
	Elective	5	2-1/2	20-20	Statistics	3(2)	4	20-21	Statistics	3(2)	4
	Elective	5	2-1/2	20-29	Inter. Ec.	4	4	20-30	Inter. Ec.	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		—	—			—	—			—	—
		15	7-1/2			15(2)	16			15(2)	16

FIFTH YEAR

Term 13 ^a				Term 14				Term 15			
	Elective	5	2-1/2	20-24	Mon. & Bkg.	4	4	20-33	Hist. Ec. Thought	4	4
	Elective	5	2-1/2	20-31	Ad. Ec. Theo.	4	4	20-32	Ad. Ec. Theo.	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		—	—	50-10	Place. Tech.	2	1			—	—
		15	7-1/2			18	17			16	16

^a Summer term—5 weeks. () indicate laboratory hours.

Curriculum in English and English-Journalism

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
23-01	West. Civ.	4	4	23-02	West. Civ.	4	4	23-03	West. Civ.	4	4
22-01	Am. Natl. Gov.	3	3	22-02	Am. Natl. Gov.	3	3	22-03	Am. Natl. Gov.	3	3
17-01	Surv. Phys. Sci.	3	3	17-02	Surv. Phys. Sci.	3	3	17-03	Surv. Phys. Sci.	3	3
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	3		Elective	3	3		Elective	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
61-01	ROTC (Basic)	16	16	61-02	ROTC (Basic)	16	16	61-03	ROTC (Basic)	16	16

SECOND YEAR

Term 4 ^a				Term 5				Term 6			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
17-04	Surv. Phys. Sci.	4	2	20-06	Ec. Prin. & Prob.	4	4	20-07	Ec. Prin. & Prob.	4	4
23-04	West. Civ.	4	2	23-17	U.S. to 1877	4	4	23-18	U.S. since 1877	4	4
	Mod. Lang.			30-33	Eng. Lit.	4	4	30-34	Eng. Lit.	4	4
	Elective	3	1-1/2		Mod. Lang.				Mod. Lang.		
30-04	Intro. to Lit.	5	2-1/2		Elective	4	4		Elective	4	4
		16	8			16	16			16	16

THIRD YEAR

Term 7 ^a				Term 8				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	30-21	Inter. Writ.	4	4	30-22	Inter. Writ.	4	4
	Elective	5	2-1/2	26-01	Prin. Soc.	4	4	26-02	Prin. Soc.	4	4
	Elective	5	2-1/2		or				or		
				30-51	Intro. Jour.	4	4	30-52	Intro. Jour.	4	4
					Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		15	7-1/2			16	16			16	16

FOURTH YEAR

Term 10 ^a				Term 11				Term 12			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	30-29	Found. Eng.			30-30	Found. Eng.		
	Elective	5	2-1/2		Lang.	4	4		Lang.	4	4
	Elective	5	2-1/2		or				or		
				30-53	Tech. of Jour.	4	4	30-54	Tech. of Jour.	4	4
				30-35	Am. Lit.	4	4	30-36	Am. Lit.	4	4
					Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		15	7-1/2			16	16			16	16

FIFTH YEAR

Term 13 ^a				Term 14				Term 15			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	30-61	Shakespeare	4	4	30-62	Shakespeare	4	4
	Elective	5	2-1/2		Eng. Elective	4	4		Eng. Elective	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
				50-10	Place. Tech.	2	1				
		15	7-1/2			18	17			16	16

^a Summer term - 5 weeks.

() indicate laboratory hours.

Curriculum in Government

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
23-01	West. Civ.	4	4	23-02	West. Civ.	4	4	23-03	West. Civ.	4	4
22-01	Am. Natl. Gov.	3	3	22-02	Am. Natl. Gov.	3	3	22-03	Am. Natl. Gov.	3	3
17-01	Surv. Phys. Sci.	3	3	17-02	Surv. Phys. Sci.	3	3	17-03	Surv. Phys. Sci.	3	3
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	3		Elective	3	3		Elective	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
61-01	ROTC (Basic)	—	—	61-02	ROTC (Basic)	—	—	61-03	ROTC (Basic)	—	—
		16	16			16	16			16	16

SECOND YEAR

Term 4 ^a				Term 5				Term 6			
17-04	Surv. Phys. Sci.	4	2	20-06	Ec. Prin. & Prob.	4	4	20-07	Ec. Prin. & Prob.	4	4
23-04	West. Civ.	4	2	23-17	U.S. to 1877	4	4	23-18	U.S. since 1877	4	4
	Mod. Lang.			22-11	For. Gov.	4	4	22-12	For. Gov.	4	4
	Elective	3	1-1/2		Mod. Lang.				Mod. Lang.		
30-04	Intro. to Lit.	5	2-1/2		Elective	4	4		Elective	4	4
		—	—			—	—			—	—
		16	8			16	16			16	16

THIRD YEAR

Term 7 ^a				Term 8				Term 9			
	Elective	5	2-1/2	22-10	Am. Pol. Part.	4	4	22-23	Am. For. Pol.	4	4
	Elective	5	2-1/2	23-11	Eur. Hist.	4	4	23-12	Eur. Hist.	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		—	—			—	—			—	—
		15	7-1/2			16	16			16	16

FOURTH YEAR

Term 10 ^a				Term 11				Term 12			
	Elective	5	2-1/2	22-17	Int. Pol.	4	4	22-20	Pub. Adm.	4	4
	Elective	5	2-1/2		Gov. Elective	4	4		Gov. Elective	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		—	—			—	—			—	—
		15	7-1/2			16	16			16	16

FIFTH YEAR

Term 13 ^a				Term 14				Term 15			
	Elective	5	2-1/2	22-13	Pol. Theory	4	4	22-14	Pol. Theory	4	4
	Elective	5	2-1/2		Gov. Elective	4	4		Gov. Elective	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
				50-10	Place. Tech.	2	1				
		—	—			—	—			—	—
		15	7-1/2			18	17			16	16

^a Summer term—5 weeks. () indicate laboratory hours.

Curriculum in History

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
23-01	West. Civ.	4	4	23-02	West. Civ.	4	4	23-03	West. Civ.	4	4
22-01	Am. Natl. Gov.	3	3	22-02	Am. Natl. Gov.	3	3	22-03	Am. Natl. Gov.	3	3
17-01	Surv. Phys. Sci.	3	3	17-02	Surv. Phys. Sci.	3	3	17-03	Surv. Phys. Sci.	3	3
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	3		Elective	3	3		Elective	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
61-01	ROTC (Basic)	16	16	61-02	ROTC (Basic)	16	16	61-03	ROTC (Basic)	16	16

SECOND YEAR

Term 4 ²				Term 5				Term 6			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
17-04	Surv. Phys. Sci.	4	2	20-06	Ec. Prin. & Prob.	4	4	20-07	Ec. Prin. & Prob.	4	4
23-04	West. Civ.	4	2	23-17	U.S. to 1877	4	4	23-18	U.S. since 1877	4	4
	Mod. Lang.			22-11	For. Gov.	4	4	22-12	For. Gov.	4	4
	Elective	3	1-1/2		Mod. Lang.				Mod. Lang.		
30-04	Intro. to Lit.	5	2-1/2		Elective	4	4		Elective	4	4
		16	8			16	16			16	16

THIRD YEAR

Term 7 ²				Term 8				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	23-13	Eng. Hist.	4	4	23-14	Eng. Hist.	4	4
	Elective	5	2-1/2	23-11	Eur. Hist.	4	4	23-12	Eur. Hist.	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		15	7-1/2			16	16			16	16

FOURTH YEAR

Term 10 ²				Term 11				Term 12			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	23-09	Anc. Greece	4	4	23-10	Anc. Rome	4	4
	Elective	5	2-1/2		or				or		
	Elective	5	2-1/2	23-24	19th Cent. Russia	4	4	23-07	Soviet Russia	4	4
					Hist. Elective	4	4		Hist. Elective	4	4
					Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		15	7-1/2			16	16			16	16

FIFTH YEAR

Term 13 ²				Term 14				Term 15			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	23-19	Lat. Am. Hist.	4	4	23-20	Lat. Am. Hist.	4	4
	Elective	5	2-1/2		Hist. Elective	4	4		Hist. Elective	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
				50-10	Place. Tech.	2	1				
		15	7-1/2			18	17			16	16

² Summer term - 5 weeks. () indicate laboratory hours.

Curriculum in Mathematics

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
11-01	Gen. Chem.	3(3)	4	11-02	Gen. Chem.	3(3)	4	11-03	Gen. Chem.	3(3)	4
14-61	Math. Anal. I	5	4	14-62	Math. Anal. II	5	4	14-63	Math. Anal. III	5	5
15-51	Physics	3	3	15-52	Physics	3	3	15-53	Physics	3	3
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	3		Elective	3	3		Elective	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
61-01	ROTC (Basic)	— — —		61-02	ROTC (Basic)	— — —		61-03	ROTC (Basic)	— — —	
		17(3)	17			17(3)	17			17(3)	18

SECOND YEAR

Term 4*				Term 5				Term 6			
11-04	Gen. Chem.	3(3)	2	30-33	Eng. Lit.	4	4	30-34	Eng. Lit.	4	4
14-64	Math. Anal. IV	5	2-1/2	14-65	Math. Anal. V	4	4	14-66	Math. Anal. VI	4	4
15-54	Physics	5	2-1/2	15-55	Physics	4(3)	5	15-56	Physics	3(3)	4
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	1-1/2		Elective	4	4		Elective	4	4
		— — —				— — —				— — —	
		16(3)	8-1/2			16(3)	17			15(3)	16

THIRD YEAR

Term 7*				Term 8				Term 9			
14-11	Theo. of Equa.	5	2-1/2	14-07	Diff. Equa. I	4	4	14-08	Diff. Equa. II	4	4
	Elective	5	2-1/2	14-31	Geometries	4	4	14-17	Inf. Series	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		— — —				— — —				— — —	
		15	7-1/2			16	16			16	16

FOURTH YEAR

Term 10*				Term 11				Term 12			
14-13	Computer Prog.	5	2-1/2	14-15	Adv. Calc.	4	4	14-16	Adv. Calc.	4	4
	Elective	5	2-1/2	14-37	Abs. Algebra	4	4	14-38	Abs. Algebra	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		— — —				— — —				— — —	
		15	7-1/2			16	16			16	16

FIFTH YEAR

Term 13*				Term 14				Term 15			
14-14	Hist. of Math.	5	2-1/2	14-28	Math. Stat.	4	4	14-29	Math. Stat.	4	4
	Elective	5	2-1/2		Math. Elec.	4	4		Math. Elec.	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
				50-10	Place. Tech.	2	1				
		— — —				— — —				— — —	
		15	7-1/2			18	17			16	16

*Summer term—5 weeks. () indicate laboratory hours.

Curriculum in Modern Languages

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
23-01	West. Civ.	4	4	23-02	West. Civ.	4	4	23-03	West. Civ.	4	4
22-01	Am. Nad. Gov.	3	3	22-02	Am. Nad. Gov.	3	3	22-03	Am. Nad. Gov.	3	3
17-01	Surv. Phys. Sci.	3	3	17-02	Surv. Phys. Sci.	3	3	17-03	Surv. Phys. Sci.	3	3
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	3		Elective	3	3		Elective	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
61-01	ROTC (Basic)	16	16	61-02	ROTC (Basic)	16	16	61-03	ROTC (Basic)	16	16

SECOND YEAR

Term 4 ^a				Term 5				Term 6			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
17-04	Surv. Phys. Sci.	4	2	20-06	Ec. Prin. & Prob.	4	4	20-07	Ec. Prin. & Prob.	4	4
23-04	West. Civ.	4	2	23-17	U.S. to 1877	4	4	23-18	U.S. since 1877	4	4
	Mod. Lang.			30-33	Eng. Lit.	4	4	30-34	Eng. Lit.	4	4
	Elective	3	1-1/2		Mod. Lang.				Mod. Lang.		
30-04	Intro. to Lit.	5	2-1/2		Elective	4	4		Elective	4	4
		16	8			16	16			16	16

THIRD YEAR

Term 7 ^a				Term 8				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	31-21	Fr. Lit.	4	4	31-22	Fr. Lit.	4	4
	Elective	5	2-1/2	32-21	Ger. Lit.	4	4	32-22	Ger. Lit.	4	4
					or				or		
	Elective	5	2-1/2	33-21	Span. Lit.	4	4	33-22	Span. Lit.	4	4
				31-17	Fr. Conv.	2	2	31-18	Fr. Conv.	2	2
					Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		15	7-1/2			18	18			18	18

FOURTH YEAR

Term 10 ^a				Term 11				Term 12			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	31-23	Fr. Class.	4	4	31-24	Fr. Class.	4	4
	Elective	5	2-1/2	32-23	Ger. Lit.	4	4	32-24	Ger. Lit.	4	4
	Elective	5	2-1/2		or				or		
				33-23	Span. Lit.	4	4	33-24	Span. Lit.	4	4
				32-17	Ger. Conv. or	2	2	32-18	Ger. Conv. or	2	2
				33-17	Span. Conv.	2	2	33-18	Span. Conv.	2	2
					Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		15	7-1/2			18	18			18	18

FIFTH YEAR

Term 13 ^a				Term 14				Term 15			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	31-25	Fr. Rom.	4	4	31-26	Fr. Rom.	4	4
	Elective	5	2-1/2	32-25	Ger. Lit.	4	4	32-26	Ger. Lit.	4	4
	Elective	5	2-1/2		or				or		
				33-25	Span. Lit.	4	4	33-26	Span. Lit.	4	4
					Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
				50-10	Place. Tech.	2	1				
		15	7-1/2			18	17			16	16

^a Summer term - 5 weeks. () indicate laboratory hours.

Curriculum in Physics

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
11-01	Gen. Chem.	3(3)	4	11-02	Gen. Chem.	3(3)	4	11-03	Gen. Chem.	3(3)	4
14-61	Math. Anal. I	5	4	14-62	Math. Anal. II	5	4	14-63	Math. Anal. III	5	5
15-51	Physics	3	3	15-52	Physics	3	3	15-53	Physics	3	3
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	3		Elective	3	3		Elective	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
61-01	ROTC (Basic)	<u>17(3)17</u>		61-02	ROTC (Basic)	<u>17(3)17</u>		61-03	ROTC (Basic)	<u>17(3)18</u>	

SECOND YEAR

Term 4 st				Term 5				Term 6			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
11-04	Gen. Chem.	3(3)	2	30-33	Eng. Lit.	4	4	30-34	Eng. Lit.	4	4
14-64	Math. Anal. IV	5	2-1/2	14-65	Math. Anal. V	4	4	14-66	Math. Anal. VI	4	4
15-54	Physics	5	2-1/2	15-55	Physics	4(3)	5	15-56	Physics	3(3)	4
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	1-1/2		Elective	4	4		Elective	4	4
		<u>16(3) 8-1/2</u>				<u>16(3)17</u>				<u>15(3)16</u>	

THIRD YEAR

Term 7 th				Term 8				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	15-64	Electronics	3(3)	4	15-16	Elect. & Mag.	3	3
	Elective	5	2-1/2	15-17	Mechanics	4	4	15-18	Mechanics	4	4
	Elective	5	2-1/2	14-07	Diff. Equa. I	4	4	14-08	Diff. Equa. II	4	4
					Lib. Elec.	4	4		Lib. Elec.	4	4
		<u>15 — 7-1/2</u>				<u>15(3)16</u>				<u>15 — 15</u>	

FOURTH YEAR

Term 10 th				Term 11				Term 12			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	15-26	Mod. Physics	4	4	15-27	Mod. Physics	4	4
	Elective	5	2-1/2	15-62	Vib. & Sound	3(3)	4	15-61	Optics	3(3)	4
	Elective	5	2-1/2		Math. Elec.	4	4		Math. Elec.	4	4
					Lib. Elec.	4	4		Lib. Elec.	4	4
		<u>15 — 7-1/2</u>				<u>15(3)16</u>				<u>15(3)16</u>	

FIFTH YEAR

Term 13 th				Term 14				Term 15			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	15-31	At. & Nucl.			15-32	At. & Nucl.		
					Physics	4	4		Physics	4	4
	Elective	5	2-1/2		Physics Elec.	4	4		Physics Elec.	4	4
	Elective	5	2-1/2		Math. Elective	4	4		Math. Elective	4	4
					Elective	4	4		Elective	4	4
				50-10	Place. Tech.	2	1				
		<u>15 — 7-1/2</u>				<u>18 — 17</u>				<u>16 — 16</u>	

* Summer term - 5 weeks. () indicate laboratory hours.

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
11-01	Gen. Chem.	3(3)	4	11-02	Gen. Chem.	3(3)	4	11-03	Gen. Chem.	3(3)	4
14-21	Basic Math.	3	3	14-22	Basic Math.	3	3	14-23	Basic Math.	3	3
10-01	Gen. Biol.	2(3)	3	10-02	Gen. Biol.	2(3)	3	10-03	Gen. Biol.	2(3)	3
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	3		Elective	3	3		Elective	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
61-01	ROTC (Basic)	—	—	61-02	ROTC (Basic)	—	—	61-03	ROTC (Basic)	—	—
		14(6)	16			14(6)	16			14(6)	16

Term 4 ²¹			Term 5			Term 6		
10-04	Gen. Biol.	3(3) 2	10-55	Comp. Anat.	3(3) 4	10-56	Comp. Anat.	3(3) 4
11-05	Gen. Chem.	3(3) 2	11-26	Org. Chem.	3(3) 4	11-27	Org. Chem.	3(3) 4
30-04	Intro. to Lit.	5 2-1/2	20-06	Ec. Prin. & Prob.	4 4	20-07	Ec. Prin. & Prob.	4 4
	Mod. Lang.			Mod. Lang.			Mod. Lang.	
	Elective	3 1-1/2		Elective	4 4		Elective	4 4
		14(6) 8			14(6) 16			14(6) 16
			Term 5-A					
			10-40	Physiology	3(3) 4			
				Eng. Elect.	4 4			
				Elective	4 4			
				Elective	4 4			
					15(3) 16			

Term 8			Term 8-A			Term 9		
11-28	Org. Chem.	4(3) 4	15-13	Gen. Physics	3(3) 5	10-41	Physiology	3(3) 4
15-11	Gen. Physics	3(3) 5		Elective	4 4	15-12	Gen. Physics	3(3) 5
	Elective	4 4		Elective	4 4		Elective	4 4
	Elective	4 4		Elective	4 4		Elective	4 4
		<u>15(6)17</u>			<u>15(3)17</u>			<u>14(6)17</u>

[‡] Summer term – 5 weeks. () indicate laboratory hours.

Prelegal Curriculum

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
00-01	English	3	3	30-02	English	3	3	30-03	English	3	3
00-01	West. Civ.	4	4	23-02	West. Civ.	4	4	23-03	West. Civ.	4	4
00-01	Am. Natl. Gov.	3	3	22-02	Am. Natl. Gov.	3	3	22-03	Am. Natl. Gov.	3	3
00-01	Surv. Phys. Sci.	3	3	17-02	Surv. Phys. Sci.	3	3	17-03	Surv. Phys. Sci.	3	3
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	3		Elective	3	3		Elective	3	3
00-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
00-01	ROTC (Basic)	—	—	61-02	ROTC (Basic)	—	—	61-03	ROTC (Basic)	—	—
		16	16			16	16			16	16

SECOND YEAR

Term 4 ^{ss}				Term 5				Term 6			
00-04	Surv. Phys. Sci.	4	2	20-06	Ec. Prin. & Prob.	4	4	20-07	Ec. Prin. & Prob.	4	4
00-04	West. Civ.	4	2	23-17	U.S. to 1877	4	4	23-18	U.S. since 1877	4	4
	Mod. Lang.			22-11	For. Gov.	4	4	22-12	For. Gov.	4	4
	Elective	3	1-1/2		Mod. Lang.				Mod. Lang.		
00-04	Intro. to Lit.	5	2-1/2		Elective	4	4		Elective	4	4
		—	—			—	—			—	—
		16	8			16	16			16	16

Term 5-A

25-01a	Intro. Psych.	3(3)	4
26-01	Prin. Soc.	4	4
	Elective	4	4
	Elective	3	3

14(3)15

THIRD YEAR

Term 8				Term 8-A				Term 9			
00-10	Am. Pol. Part.	4	4		Gov. Elect.	4	4	22-23	Amer. For. Pol.	4	4
00-13	Eng. Hist.	4	4		Hist. Elect.	4	4	23-14	Eng. Hist.	4	4
00-01	Public Speaking	4	4		Elective	4	4	29-02	Public Speaking	4	4
	Elective	4	4		Elective	4	4		Elective	4	4
		—	—		Elective	4	4			—	—
		16	16			20	20			16	16

note: Prelegal students who have completed the above program may qualify for the A.B. degree under the Combined Program described on page 78, or by continuing for a fourth year as a History or Government major.

Summer term—5 weeks. () indicate laboratory hours

Premedical Curriculum

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
11-01	Gen. Chem.	3(3)	4	11-02	Gen. Chem.	3(3)	4	11-03	Gen. Chem.	3(3)	4
14-21	Basic Math.	3	3	14-22	Basic Math.	3	3	14-23	Basic Math.	3	3
10-01	Gen. Biol.	2(3)	3	10-02	Gen. Biol.	2(3)	3	10-03	Gen. Biol.	2(3)	3
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	3		Elective	3	3		Elective	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
61-01	ROTC (Basic)	14	16	61-02	ROTC (Basic)	14	16	61-03	ROTC (Basic)	14	16

SECOND YEAR

Term 4 ^a				Term 5				Term 6			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
10-04	Gen. Biol.	3(3)	2	10-55	Comp. Anat.	3(3)	4	10-56	Comp. Anat.	3(3)	4
11-05	Gen. Chem.	3(3)	2	11-26	Org. Chem.	3(3)	4	11-27	Org. Chem.	3(3)	4
30-04	Intro. to Lit.	5	2-1/2	20-06	Ec. Prin. & Prob.	4	4	20-07	Ec. Prin. & Prob.	4	4
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	1-1/2		Elective	4	4		Elective	4	4
		14	8			14	16			14	16

THIRD YEAR

Term 7 ^a				Term 8				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	10-40	Physiology	3(3)	4	10-41	Physiology	3(3)	4
	Elective	5	2-1/2	10-61	Embryology	3(3)	4	10-62	Embryology	3(3)	4
	Elective	5	2-1/2	11-28	Org. Chem.	4(3)	5		Elective	4	4
					Elective	4	4		Elective	4	4
		15	7-1/2			14	17			14	16

FOURTH YEAR

Term 10 ^a				Term 11				Term 12			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	11-17	Quant. Anal.	3(3)	4	11-18	Quant. Anal.	2(3)	3
	Elective	5	2-1/2	15-11	Gen. Phys.	3(3)	5	15-12	Gen. Phys.	3(3)	5
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		15	7-1/2			14	17			13	16

FIFTH YEAR

Term 13 ^a				Term 14				Term 15			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	15-13	Gen. Phys.	3(3)	5		Biology Elec.	4	4
	Elective	5	2-1/2		Biology Elec.	4	4		Elective	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		15	7-1/2			15	17			16	16

Note: Premedical students may be excused from the Co-operative Plan and may complete this program in four years, or a three years may take advantage of the Combined Program described on page 78.

^a Summer term—5 weeks. () indicate laboratory hours.

Curriculum in Medical Technology

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
0-01	English	3	3	30-02	English	3	3	30-03	English	3	3
1-01	Gen. Chem.	3(3)	4	11-02	Gen. Chem.	3(3)	4	11-03	Gen. Chem.	3(3)	4
4-21	Basic Math.	3	3	14-22	Basic Math.	3	3	14-23	Basic Math.	3	3
0-01	Gen. Biol.	2(3)	3	10-02	Gen. Biol.	2(3)	3	10-03	Gen. Biol.	2(3)	3
	Lang. Elective	3	3		Lang. Elective	3	3		Lang. Elective	3	3
5-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
1-01	ROTC (Basic)	— — —		61-02	ROTC (Basic)	— — —		61-03	ROTC (Basic)	— — —	
		14(6)	16			14(6)	16			14(6)	16

SECOND YEAR

Term 4*				Term 5				Term 6			
0-04	Gen. Biol.	3(3)	2	10-20	Gen. Bact.	3(3)	4	10-21	Gen. Bact.	3(3)	4
0-30	Intro. Med. Tech.	6	3	10-31	Hematology	3(3)	4	10-32	Human Anat.	3(3)	4
0-04	Gen. Chem.	3(3)	2	11-26	Org. Chem.	3(3)	4	11-27	Org. Chem.	3(3)	4
	Lang. Elective	3	1-1/2		Lang. Elective	4	4		Lang. Elective	4	4
		15(6)	8-1/2			13(9)	16			13(9)	16

THIRD YEAR

Term 7*				Term 8				Term 9			
0-33	Immunology	2(3)	2-1/2	10-40	Physiology	3(3)	3	10-41	Physiology	3(3)	4
	Elective	5	2-1/2	11-17	Quant. Anal.	3(3)	4	11-18	Quant. Anal.	2(3)	3
	Elective	5	2-1/2	11-28	Org. Chem.	4(3)	5	11-45	Biol. Chem.	4	4
					Elective	4	4		Elective	4	4
		12(3)	7-1/2			14(9)	16			13(6)	15

FOURTH YEAR

Term 10*				Term 11				Term 12			
	Elective	5	2-1/2	10-59	An. Histol.	3(3)	4	10-60	An. Histol.	3(3)	4
	Elective	5	2-1/2	10-69	Hist. Tech.	1(6)	3	10-70	Hist. Tech.	1(6)	3
	Elective	5	2-1/2	15-11	Gen. Physics	3(3)	5	15-12	Gen. Physics	3(3)	5
					Elective	4	4	11-77	Instrum. Anal.	3(3)	4
		15	7-1/2			11(12)	16			10(15)	16

FIFTH YEAR

Term 13*				Term 14				Term 15			
	Elective	5	2-1/2	10-61	Embryology	3(3)	4	10-62	Embryology	3(3)	4
	Elective	5	2-1/2	25-09	Statistics	4	4	25-10	Statistics	4	4
	Elective	5	2-1/2	10-78	Seminar	1	1	10-79	Seminar	1	1
				15-13	Gen. Physics	3(3)	5	11-41	Chem. Lit.	3	3
					Elective	4	4		Elective	4	4
				50-20	Place. Tech.	2	1				
		15	7-1/2			17(6)	19			15(3)	16

Summer term - 5 weeks. () indicate laboratory hours.

Curriculum in Psychology

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
23-01	West. Civ.	4	4	23-02	West. Civ.	4	4	23-03	West. Civ.	4	4
14-21	Basic Math.	3	3	14-22	Basic Math.	3	3	14-23	Basic Math.	3	3
10-01	Gen. Biol.	2(3)	3	10-02	Gen. Biol.	2(3)	3	10-03	Gen. Biol.	2(3)	3
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	3		Elective	3	3		Elective	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
61-01	ROTC (Basic)	—	—	61-02	ROTC (Basic)	—	—	61-03	ROTC (Basic)	—	—
		15(3)	16			15(3)	16			15(3)	16

SECOND YEAR

Term 4 ^a				Term 5				Term 6			
10-04	Gen. Biol.	3(3)	2	20-06	Ec. Prin. & Prob.	4	4	20-07	Ec. Prin. & Prob.	4	4
23-04	West. Civ.	4	2	25-01a	Intro. Psych.	3(3)	4	25-02a	Gen. Psych.	3(3)	4
	Mod. Lang.			26-01	Prin. Soc.	4	4	26-02	Prin. Soc.	4	4
	Elective	3	1-1/2		Mod. Lang.				Mod. Lang.		
30-04	Intro. to Lit.	5	2-1/2		Elective	4	4		Elective	4	4
		15(3)	8			15(3)	16			15(3)	16

THIRD YEAR

Term 7 ^a				Term 8				Term 9			
	Elective	5	2-1/2	25-09	Statistics	4	4	25-10	Statistics	4	4
	Elective	5	2-1/2	25-12	Exp. Psych.	3(3)	4	25-13	Exp. Psych.	3(3)	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		15	7-1/2			15(3)	16			15(3)	16

FOURTH YEAR

Term 10 ^a				Term 11				Term 12			
	Elective	5	2-1/2	25-17	Measurements	4	4	25-14	Exp. Psych.	3(3)	4
	Elective	5	2-1/2	25-34	Child. Psych.	4	4	25-37	Child Psych.	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
		15	7-1/2			16	16			15(3)	16

FIFTH YEAR

Term 13 ^a				Term 14				Term 15			
	Elective	5	2-1/2	25-31	Ab. Psych.	4	4	25-32	Ab. Psych.	4	4
	Elective	5	2-1/2	25-41	Adv. Psych.	4	4	25-42	Adv. Psych.	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
				50-10	Place. Tech.	2	1				
		15	7-1/2			18	17			16	16

^a Summer term - 5 weeks. () indicate laboratory hours.

Curriculum in Sociology

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
0-01	English	3	3	30-02	English	3	3	30-03	English	3	3
1-01	West. Civ.	4	4	23-02	West. Civ.	4	4	23-03	West. Civ.	4	4
2-01	Am. Natl. Gov.	3	3	22-02	Am. Natl. Gov.	3	3	22-03	Am. Natl. Gov.	3	3
3-01	Surv. Phys. Sci.	3	3	17-02	Surv. Phys. Sci.	3	3	17-03	Surv. Phys. Sci.	3	3
	Mod. Lang.				Mod. Lang.				Mod. Lang.		
	Elective	3	3		Elective	3	3		Elective	3	3
5-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
6-01	ROTC (Basic)	16	16	61-02	ROTC (Basic)	16	16	61-03	ROTC (Basic)	16	16

SECOND YEAR

Term 4 ^a				Term 5				Term 6			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
7-04	Surv. Phys. Sci.	4	2	20-06	Ec. Prin. & Prob.	4	4	20-07	Ec. Prin. & Prob.	4	4
8-04	West. Civ.	4	2	25-01a	Intro. Psych.	3(3)	4	25-02a	Gen. Psych.	3(3)	4
	Mod. Lang.			26-01	Prin. Soc.	4	4	26-02	Prin. Soc.	4	4
	Elective	3	1-1/2		Mod. Lang.				Mod. Lang.		
9-04	Intro. to Lit.	5	2-1/2		Elective	4	4		Elective	4	4
		16	8			15(3)	16			15(3)	16

THIRD YEAR

Term 7 ^a				Term 8				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	26-08	Comp. Culture	4	4	26-09	Am. Culture	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
		15	7-1/2			16	16			16	16

FOURTH YEAR

Term 10 ^a				Term 11				Term 12			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	26-11	Soc. Prob.	4	4	26-12	Ind. & Soc.	4	4
	Elective	5	2-1/2	26-16	Criminology	4	4	26-17	Urban Soc.	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
		15	7-1/2			16	16			16	16

FIFTH YEAR

Term 13 ^a				Term 14				Term 15			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	5	2-1/2	26-19	Soc. Theory	4	4	26-20	Soc. Theory	4	4
	Elective	5	2-1/2		Soc. Elective	4	4		Soc. Elective	4	4
	Elective	5	2-1/2		Elective	4	4		Elective	4	4
		15	7-1/2	50-10	Place. Tech.	2	1		Elective	4	4
		15	7-1/2			18	17			16	16

Summer term—5 weeks. () indicate laboratory hours.

THE COLLEGE OF EDUCATION

General Objectives

The widespread anxiety, insecurity, and confusion present in the world suggest a need for teachers who can guide students (1) in making sense in apparent chaos, (2) in defining and attacking urgent problems appropriate to their level of development, and (3) in mastering a variety of skills and insights for purposes of effective adjustment with their total environment. Teachers today must know more about more things than ever before. In addition, they must be able to utilize such knowledge so that understanding grows into the nervous systems of students. Appropriate value judgments will then become an integrating aspect of living.

In order to achieve this, teachers in our elementary and secondary schools must be excellent examples of free men functioning in a free society, must be intelligent, emotionally controlled and flexible, healthy, and creative. Teachers should like people without being emotionally dependent upon them. They must be convinced of the power of education and a teacher's value to society.

To prepare such teachers, Northeastern University will require (1) that a considerable portion of the student's time be devoted to a broad general education, (2) that a student know thoroughly his major field of study, and (3) that he have a series of vital professional experiences before being declared competent to teach. Consistent with sound learning, best judgment, and the established policy of the University, the College of Education will attempt to correlate in these professional experiences practice and theory.

It is the purpose of the College to adapt its programs to meet the individual needs of the students whom it serves and thus to contribute in a significant way to the increase in numbers and effectiveness of the teachers who will be needed for the education of the constantly growing school population.

All information available suggests that there will be a continuing need for teachers in the elementary schools of the nation for many years. In addition, there are critical shortages of science and mathematics teachers and growing shortages in other fields as well.

This catalog deals chiefly with the undergraduate curricula of the College which are designed for young men and women coming directly from high school or returning from the armed services. Teachers who are interested in the graduate program may obtain the circular outlining these courses from the Dean of the College.

Admission Requirements

Applicants for admission to the freshman class must qualify by graduation from an accredited secondary school or the equivalent. The secondary school preparation must include the subjects listed on page 30.

Graduation Requirements

Degrees

The College of Education will award the degree of Bachelor of Science in Education to those who successfully complete the program of preparation for teaching at elementary or secondary school levels.

Quantitative Requirements

The required courses in each of the undergraduate curricula in the College of Education are indicated on the following pages. Each curriculum requires not less than 214 credit hours of classwork, including 20 weeks of student teaching. At least 36 credit hours will be required in Education, including student teaching.

Elective Courses

Elective courses, approved by the Dean of the College of Education, will be selected by the student from among courses in the Colleges of Liberal Arts and Business Administration.

Qualitative Requirements

Students in the College of Education will be expected to maintain an over-all average of C while doing work of C+ or better in the field of specialization and in the professional sequence in order to be recommended for placement. Students are warned that any failure seriously handicaps their records and must be made up at the earliest opportunity.

Graduation with Honors

Candidates of distinctly superior achievement in their academic work will be graduated with honor. Upon special vote of the faculty a limited number of this group may be graduated with high honor or with highest honor. Students must have been in attendance at the University at least three years before they may become eligible for honors at graduation.

Co-operative Plan

Upon successfully completing thirty-five weeks of academic work, students in the College of Education are urged to elect the Co-operative Plan. In this program periods of classroom work alternate with a variety of work experiences in industry, social service agencies, community organizations, etc. This program, which has proved to be of inestimable value in offering students both the theoretical and practical aspects of a broad education, is consistent with the philosophy of the College of Education.

Intern Program

Opportunities are increasing steadily for selected students to participate as employees of co-operating school departments. Assisting in administrative as well as instructional functions, the student enjoys unique opportunity to acquire broad viewpoints and rich experience which will greatly enhance his confidence and effectiveness as a teacher.

Full-Time Students

Students desiring to attend the College of Education on the traditional four-year plan will be required to attend 40 weeks in both their junior and senior years. The third year will be composed of four terms of academic work, the fourth year of two terms of academic work and two terms of student teaching.

Programs of Instruction

Students in the College of Education may choose a field of specialization in accordance with their particular interests and aptitudes. Specimen programs are shown on the pages which follow. While all but one are presented as co-operative programs, it is possible for full-time students to complete approximately the same programs in four years. These curricula are organized so that each student may acquire a comprehensive background in preparation for elementary education, industrial arts education, physical education (open to men students only), and the following secondary fields: English, social studies, science, and mathematics.

Students preparing for elementary teaching should plan either to secure an academic major in social studies or English or two minors from the following: art, English, social studies, psychology, sociology, modern languages, and physical education. A minor in modern languages would require at least two years of high school preparation in that language.

Program for Industrial Arts Teaching

In collaboration with Wentworth Institute, Northeastern University is prepared to offer a unique program in the preparation of teachers in Industrial Arts education. A student interested in this program will attend Wentworth Institute for two years and then, upon the presentation of proper credentials, can apply for admission to the College of Education at Northeastern. Once admitted, he will complete, at Northeastern, his preparation in General Education and Professional Education, either as a full-time or co-operative student.

National Teacher Examinations

All students who expect to make teaching their career will be expected to take the general and special National Teacher Examinations in their senior year.

FIRST YEAR				Term 2				Term 3					
Course		Cl.	Cr.	No.	Course		Cl.	Cr.	No.	Course		Cl.	Cr.
01	English	3	3	30-02	English	3	3	30-03	English	3	3		
01	West. Civ.	4	4	23-02	West. Civ.	4	4	23-03	West. Civ.	4	4		
01	Am. Natl. Gov.	3	3	22-02	Am. Natl. Gov.	3	3	22-03	Am. Natl. Gov.	3	3		
01	Surv. Phys. Sci.	3	3	17-02	Surv. Phys. Sci.	3	3	17-03	Surv. Phys. Sci.	3	3		
60	Soc. Sci. I	3	3	21-61	Soc. Sci. II	3	3	21-62	Soc. Sci. III	3	3		
10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.				
or				or				or					
01	ROTC (Basic)			61-02	ROTC (Basic)			61-03	ROTC (Basic)				
$\overline{16} \quad \overline{16}$				$\overline{16} \quad \overline{16}$				$\overline{16} \quad \overline{16}$					
COND YEAR				Term 5				Term 6					
Term 4 st				21-51	Human Dev. I	3	3	21-32	Reading in				
04	Intro. to Lit.	5	2-1/2	29-01	Public Speaking	4	4		El. Schools	3	3		
04	West. Civ.	4	2	17-11	Intro. Nat. Hist.	4	4	21-42	Fund. Conc. Arith.	3	3		
04	Surv. Phys. Sci.	4	2	21-31	El. Lang. Arts	3	3	21-52	Human Dev. II	3	3		
				21-41	Fund. Conc. Arith.	3	3	17-12	Intro. Nat. Hist.	4	4		
									Elective	4	4		
$\overline{13} \quad \overline{6-1/2}$				$\overline{17} \quad \overline{17}$				$\overline{17} \quad \overline{17}$					
THIRD YEAR				Term 8				Term 9					
Term 7 th				21-53E	Learn. & Teach. I			21-54E	Learn. & Teach. II				
Elective		8	4		Elem. Lab.	0(2)	2		Elem. Lab.	0(2)	2		
Elective		8	4	21-53	Learn. & Teach. I	3	3	21-54	Learn. & Teach. II	3	3		
		$\overline{16} \quad \overline{8}$		23-17	Am. Hist. to 1820	4	4	23-18	The U.S. 1820-				
				21-37	Arts & Crafts				1890	4	4		
					El. Sch.	3	3	21-38	El. Sch. Mus.	3	3		
				30-35	Amer. Lit. to 1860	4	4	30-36	Am. Lit. after				
									1860	4	4		
				$\overline{14(2)} \quad \overline{16}$				$\overline{14(2)} \quad \overline{16}$					
FOURTH YEAR				Term 11				Term 12					
Term 10 th				20-06	Ec. Prin. & Prob.	4	4	20-07	Ec. Prin. & Prob.	4	4		
Elective		8	4	21-39	El. Sch. Soc.			21-44	Meth. & Mat. El.				
Elective		8	4		Studies	3	3		Sci. & Arith.	3	3		
		$\overline{16} \quad \overline{8}$		30-33	Surv. Eng. Lit.	4	4	21-50	Spec. Education	1-1/2	2		
					Elective	4	4	30-34	Surv. Eng. Lit.	4	4		
					Elective	3	3		Elective	4	4		
				$\overline{18} \quad \overline{18}$				$\overline{16-1/2} \quad \overline{17}$					
FIFTH YEAR				Term 14				Term 15					
				21-55	Backgrounds of			21-56	Backgrounds of				
					Am. Ed. I	3	3		Am. Ed. II	3	3		
					Elective	4	4		Elective	4	4		
					Elective	4	4		Elective	4	4		
					Elective	4</							

* Summer term - 5 weeks. () indicate laboratory hours.
 ** 21-40 Student Teaching (14 credits) is required during both co-operative work periods of the senior year.

Program in Teaching of English

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
23-01	West. Civ.	4	4	23-02	West. Civ.	4	4	23-03	West. Civ.	4	4
22-01	Am. Natl. Gov.	3	3	22-02	Am. Natl. Gov.	3	3	22-03	Am. Natl. Gov.	3	3
17-01	Surv. Phys. Sci.	3	3	17-02	Surv. Phys. Sci.	3	3	17-03	Surv. Phys. Sci.	3	3
21-60	Soc. Sci. I	3	3	21-61	Soc. Sci. II	3	3	21-62	Soc. Sci. III	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
61-01	ROTC (Basic)	16	16	61-02	ROTC (Basic)	16	16	61-03	ROTC (Basic)	16	16

SECOND YEAR

Term 4 ^{ss}				Term 5				Term 6			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-04	Intro. to Lit.	5	2-1/2	21-51	Human Dev. I	3	3	21-52	Human Dev. II	3	3
23-04	West. Civ.	4	2	29-01	Public Speaking	4	4	23-12	19th Cent. Eur.	4	4
17-04	Surv. Phys. Sci.	4	2	23-11	18th Cent. Eur.	4	4	24-02	Prob. of Phil.	4	4
		13	6-1/2	24-01	Intro. to Phil.	4	4	30-34	Surv. Eng. Lit.	4	4
				30-33	Surv. Eng. Lit.	4	4		Elective	4	4
						19	19			19	19

THIRD YEAR

Term 7 ^{ss}				Term 8				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	8	4	21-53S	Learn. & Teach. I			21-54S	Learn. & Teach. II		
	Elective	8	4		Sec. Lab.	0(2)	2		Sec. Lab.	0(2)	2
		16	8	21-53	Learn. & Teach. I	3	3	21-54	Learn. & Teach. II	3	3
				23-17	Am. Hist.			23-18	The U.S. 1820-1890	4	4
					to 1820	4	4	30-36	Am. Lit. after 1860	4	4
				30-35	Am. Lit. to 1860	4	4	30-62	Shakespeare	4	4
				30-61	Shakespeare	4	4			15(2)	15
						15(2)	17			15(2)	15

FOURTH YEAR

Term 10 ^{ss}				Term 11				Term 12			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	8	4	21-20	Meth. & Mat. English	3	3	21-58	Meas. & Eval. of Learning	3	3
	Elective	8	4	30-21	Inter. Writing	4	4	30-22	Inter. Writing	4	4
		16	8		Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
						15	15			15	15

FIFTH YEAR

Term 14				Term 15			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
21-55	Backgrounds of Am. Ed. I	3	3	21-56	Backgrounds of Am. Ed. II	3	3
30-51	Intro. to Journalism	4	4	30-52	Intro. to Journalism	4	4
	Elective	4	4		Elective	4	4
	Elective	4	4		Elective	4	4
		15	15			15	15

Terms 14A and 15A (2 terms)^{ss}

21-40 Student Teaching and Related Seminar 14 Credits

^{ss} Summer term - 5 weeks. () indicate laboratory hours.^{ss} 21-40 Student Teaching (14 credits) is required during both co-operative work periods of the senior year.

Program in Teaching of Social Studies

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
01	English	3	3	30-02	English	3	3	30-03	English	3	3
01	West. Civ.	4	4	23-02	West. Civ.	4	4	23-03	West. Civ.	4	4
01	Am. Natl. Gov.	3	3	22-02	Am. Natl. Gov.	3	3	22-03	Am. Natl. Gov.	3	3
01	Surv. Phys. Sci.	3	3	17-02	Surv. Phys. Sci.	3	3	17-03	Surv. Phys. Sci.	3	3
60	Soc. Sci. I	3	3	21-61	Soc. Sci. II	3	3	21-62	Soc. Sci. III	3	3
10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
01	ROTC (Basic)	16	16	61-02	ROTC (Basic)	16	16	61-03	ROTC (Basic)	16	16

SECOND YEAR

Term 4 ^a				Term 5				Term 6			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
04	Intro. to Lit.	5	2-1/2	21-51	Human Dev. I	3	3	21-52	Human Dev. II	3	3
04	West. Civ.	4	2	29-01	Public Speaking	4	4	23-12	19th Cent. Eur.	4	4
04	Surv. Phys. Sci.	4	2	23-11	18th Cent. Eur.	4	4	24-02	Prob. of Phil.	4	4
				24-01	Intro. to Phil.	4	4	30-34	Surv. Eng. Lit.	4	4
				30-33	Surv. Eng. Lit.	4	4		Elective	4	4
		13	6-1/2			19	19			19	19

THIRD YEAR

Term 7 ^a				Term 8				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	8	4	21-53S	Learn. & Teach. I			21-54S	Learn. & Teach. II		
	Elective	8	4		Sec. Lab.	0(2)	2		Sec. Lab.	0(2)	2
		16	8	21-53	Learn. & Teach. I	3	3	21-54	Learn. & Teach. II	3	3
				23-17	Am. Hist. to 1820	4	4	23-18	The U.S. 1820-1890	4	4
				30-35	Am. Lit. to 1860	4	4	30-36	Am. Lit. after 1860	4	4
					Elective	4	4		Elective	4	4
						15(2)	17			15(2)	17

FOURTH YEAR

Term 10 ^a				Term 11				Term 12			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	8	4	20-06	Ec. Prin. & Prob.	4	4	20-07	Ec. Prin. & Prob.	4	4
	Elective	8	4	21-25	Meth. & Mat. Social Studies	3	3	21-58	Meas. & Eval. of Learning	3	3
		16	8	22-11	For. Gov. Hist. Elective	4	4	22-12	For. Gov. Hist. Elective	4	4
						15	15			15	15

FIFTH YEAR

Term 14				Term 15			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
22-13	Pol. Theory	4	4	22-14	Pol. Theory	4	4
21-55	Backgrounds of Am. Ed. I	3	3	21-56	Backgrounds of Am. Ed. II	3	3
	Elective	4	4		Elective	4	4
	Elective	4	4		Elective	4	4
		15	15			15	15
Terms 14A and 15A (2 terms) ^b							
21-40 Student Teaching and Related Seminar 14 Credits							

^a Summer term - 5 weeks. () indicate laboratory hours.^b 21-40 Student Teaching (14 credits) is required during both co-operative work periods of the senior year.

Program in Teaching of Mathematics

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
11-01	Gen. Chem.	3(3)	4	11-02	Gen. Chem.	3(3)	4	11-03	Gen. Chem.	3(3)	4
14-61	Math. Anal. I	5	4	14-62	Math. Anal. II	5	4	14-63	Math. Anal. III	5	4
15-51	Physics	3	3	15-52	Physics	3	3	15-53	Physics	3	3
21-60	Soc. Sci. I	3	3	21-61	Soc. Sci. II	3	3	21-62	Soc. Sci. III	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
61-01	ROTC (Basic)	<u>17(3)</u> <u>17</u>		61-02	ROTC (Basic)	<u>17(3)</u> <u>17</u>		61-03	ROTC (Basic)	<u>17(3)</u> <u>18</u>	

SECOND YEAR

Term 4 ^a				Term 5				Term 6			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
11-04	Gen. Chem.	3(3)	2	21-51	Human Dev. I	3	3	21-52	Human Dev. II	3	3
14-64	Math. Anal. IV	5	2-1/2	29-01	Public Speaking	4	4	14-66	Math. Anal. VI	4	4
15-54	Physics	5	2-1/2	14-65	Math. Anal. V	4	4	15-56	Physics	3(3)	4
		<u>13(3)</u> <u>7</u>		15-55	Physics	4(3)	5		Elective	4	4
						<u>15(3)</u> <u>16</u>				<u>14(3)</u> <u>15</u>	

THIRD YEAR

Term 7 ^a				Term 8				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	8	4	14-07	Diff. Equa. I	4	4	14-08	Diff. Equa. II	4	4
	Elective	8	4	21-53	Learn. & Teach. I	3	3	21-54	Learn. & Teach. II	3	3
		<u>16</u> <u>8</u>		21-53S	Learn. & Teach. I			21-54S	Learn. & Teach. II		
					Sec. Lab.	0(2)	2		Sec. Lab.	0(2)	2
					Math. Elective	4	4		Math. Elective	4	4
					Elective	4	4		Elective	4	4
						<u>15(2)</u> <u>17</u>				<u>15(2)</u> <u>17</u>	

FOURTH YEAR

Term 10 ^a				Term 11				Term 12			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
	Elective	8	4	21-23	Meth. & Mat.			21-58	Meas. & Eval.		
	Elective	8	4		Mathematics	3	3		of Learning	3	3
		<u>16</u> <u>8</u>		30-35	Am. Lit. to			30-36	Am. Lit. after		
					1860	4	4		1860	4	4
				23-17	Am. Hist.			23-18	The U.S. 1820-		
					to 1820	4	4		1890	4	4
					Math. Elective	4	4		Math. Elective	4	4
						<u>15</u> <u>15</u>				<u>15</u> <u>15</u>	

FIFTH YEAR

Term 14				Term 15			
21-55	Backgrounds of			21-56	Backgrounds of		
	Am. Ed. I	3	3		Am. Ed. II	3	3
	Math. Elective	4	4		Math. Elective	4	4
	Elective	4	4		Elective	4	4
	Elective	4	4		Elective	4	4
		<u>15</u>	<u>15</u>			<u>15</u>	<u>15</u>
Terms 14A and 15A (2 terms) ^(B)							
21-40 Student Teaching and							
Related Seminar				14 Credits			

^a Summer term - 5 weeks. () indicate laboratory hours.^b 21-40 Student Teaching (14 credits) is required during both co-operative work periods of the senior year.

Program in Teaching of Science

FIRST YEAR											
Term 1				Term 2				Term 3			
Course	Cl.	Cr.		No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
01 English	3	3		30-02	English	3	3	30-03	English	3	3
01 Gen. Chem.	3(3)	4		11-02	Gen. Chem.	3(3)	4	11-03	Gen. Chem.	3(3)	4
51 Math. Anal. I	5	4		14-62	Math. Anal. II	5	4	14-63	Math. Anal. III	5	5
51 Physics	3	3		15-52	Physics	3	3	15-53	Physics	3	3
50 Soc. Sci. I	3	3		21-61	Soc. Sci. II	3	3	21-62	Soc. Sci. III	3	3
10 Phys. Ed.				16-11	Phys. Ed.			16-12	Phys. Ed.		
or				or				or			
11 ROTC (Basic)				61-02	ROTC (Basic)			61-03	ROTC (Basic)		
	17(3)	17				17(3)	17			17(3)	18
SECOND YEAR											
Term 4 ^{ss}				Term 5				Term 6			
04 Gen. Chem.	3(3)	2		21-51	Human Dev. I	3	3	21-52	Human Dev. II	3	3
54 Math. Anal. IV	5	2-1/2		29-01	Public Speaking	4	4	14-66	Math. Anal. VI	4	4
54 Physics	5	2-1/2		14-65	Math. Anal. V	4	4	15-56	Physics	3(3)	4
				15-55	Physics	4(3)	5	Elective		4	4
	13(3)	7				15(3)	16			14(3)	15
THIRD YEAR											
Term 7 ^{ss}				Term 8				Term 9			
Elective	8	4		14-07	Diff. Equa. I	4	4	14-08	Diff. Equa. II	4	4
Elective	8	4		21-53	Learn. & Teach. I	3	3	21-54	Learn. & Teach. II	3	3
	16	8		21-53S	Learn. & Teach. I			21-54S	Learn. & Teach. II		
				Sec. Lab.		0(2)	2	Sec. Lab.		0(2)	2
				Sci. Elective		4	4	Sci. Elective		4	4
				Elective		4	4	Elective		4	4
						15(2)	17			15(2)	17
FOURTH YEAR											
Term 10 ^{ss}				Term 11				Term 12			
Elective	8	4		21-22	Meth. & Mat. Science	3	3	21-58	Meas. & Eval. of Learning	3	3
Elective	8	4		30-35	Am. Lit. to 1860	4	4	30-36	Am. Lit. after 1860	4	4
	16	8		23-17	Am. Hist. to 1820	4	4	23-18	The U.S. 1820-1890	4	4
				Sci. Elective		4	4	Sci. Elective		4	4
						15	15			15	15
FIFTH YEAR											
Term 14				Term 15				Term 16			
21-55	Backgrounds of Am. Ed. I	3	3	21-56	Backgrounds of Am. Ed. II	3	3				
	Sci. Elective	4	4		Sci. Elective	4	4				
	Elective	4	4		Elective	4	4				
	Elective	4	4		Elective	4	4				
		15	15			15	15			15	15
Terms 14A and 15A (2 terms) ^{ss}											
21-40 Student Teaching and Related Seminar 14 Credits											

Summer term - 5 weeks. () indicate laboratory hours.

21-40 Student Teaching (14 credits) is required during both co-operative work periods of the senior year.

Program in Teaching of Physical Education

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
16-15	Anat. & Phys.	3	3	16-16	Anat. & Phys.	3	3	16-17	Anat. & Phys.	3	3
17-01	Surv. Phys. Sci.	3	3	17-02	Surv. Phys. Sci.	3	3	17-03	Surv. Phys. Sci.	3	3
27-21	Found. West. Culture	4	4	27-22	Found. West. Culture	4	4	27-23	Found. West. Culture	4	4
21-60	Soc. Sci. I	3	3	21-61	Soc. Sci. II	3	3	21-62	Soc. Sci. III	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
or				or				or			
61-01	ROTC (Basic)	$\overline{16} - \overline{16}$		61-02	ROTC (Basic)	$\overline{16} - \overline{16}$		61-03	ROTC (Basic)	$\overline{16} - \overline{16}$	

SECOND YEAR

Term 4 ^a				Term 5				Term 6			
30-04	Intro. to Lit.	5	2-1/2	21-51	Human Dev. I	3	3	21-52	Human Dev. II	3	3
16-18	Indiv. Sports	0(8)	4	23-17	Am. Hist. to 1820	4	4	23-18	The U.S. 1820-1890	4	4
27-24	Found. West. Culture	5	2-1/2	16-25	Football	4	4	16-27	Basket. & Base.	4	4
		$\overline{10(8)}$	$\overline{9}$	16-31	Kinesiology	4	4	16-32	Phys. of Exer.	4	4
				21-41	Fund. Conc. Arith. or	3	3	21-42	Fund. Conc. Arith. or	3	3
				14-41	Fund. of Math. I	3	3	14-42	Fund. of Math. II	3	3
						$\overline{18} - \overline{18}$				$\overline{18} - \overline{18}$	

THIRD YEAR

Term 7 ^a				Term 8				Term 9			
14-41	Fund. of Math. I or	5	2-1/2	21-53	Learn. & Teach. I	3	3	21-54	Learn. & Teach. II	3	3
21-41	Fund. Conc. Arith.	5	2-1/2	21-53S	Learn. & Teach. I Sec. Lab.	0(2)	2	21-54S	Learn. & Teach. II Sec. Lab.	0(2)	2
	Elective	8	4	29-01	Public Speaking	4	4	16-28	Calis. & Gymnast.	4	4
		$\overline{13} - \overline{6-1/2}$		16-26	Track & Field	4	4	16-34	Comm. Hlth. & Safety	4	4
				16-33	Pers. Hygiene	4	4		Elective	4	4
						$\overline{15(2)}\overline{17}$				$\overline{15(2)}\overline{17}$	

FOURTH YEAR

Term 10 ^a				Term 11				Term 12			
14-42	Fund. of Math. II or	5	2-1/2	30-35	Am. Lit. to 1860	4	4	30-36	Am. Lit. after 1860	4	4
21-42	Fund. Conc. Arith.	5	2-1/2	16-35	Prev. & Care of Injuries	4	4	16-36	Adv. Gymnast.	4	4
	Elective	8	4	21-29	Meth. & Mat. Phys. Ed.	3	3	21-30	Meas. & Eval. Phys. Ed.	3	3
		$\overline{13} - \overline{6-1/2}$			Elective	4	4		Elective	4	4
						$\overline{15} - \overline{15}$				$\overline{15} - \overline{15}$	

FIFTH YEAR

Term 14				Term 15			
21-55	Backgrounds of Am. Ed. I	3	3	21-56	Backgrounds of Am. Ed. II	3	3
16-19	Indiv. Sports	0(2)	2	16-20	Indiv. Sports	0(2)	2
16-23	Hist. Phys. Ed.	4	4	16-24	Org. & Admin. of Phys. Ed.	4	4
	Elective	4	4		Elective	4	4
	Elective	4	4		Elective	4	4
		$\overline{15(2)}\overline{17}$				$\overline{15(2)}\overline{17}$	

Terms 14A and 15A (2 terms)^{ab}

21-40 Student Teaching and

Related Seminar 14 Credits

^a Summer term - 5 weeks. () indicate laboratory hours.^{ab} 21-40 Student Teaching (14 credits) is required during both co-operative work periods of the senior year

Program in Teaching of Industrial Arts

FIRST TWO YEARS - At Wentworth Institute

Depending upon which program a student follows at Wentworth, he may transfer to Northeastern University College of Education with either 40 semester hours (64 credit hours) or 60 semester hours (96 credit hours).

Plan I. The program below indicates the way a person may pursue his program at Northeastern by transferring 64 credit hours. He may attend one full-time year of 30 weeks and two co-operative years of 25 weeks each. In all he will need 80 weeks of academic work plus 20 weeks of student teaching.

Plans II and III. Transferring with 96 credit hours, a student may take three years on the Co-operative Plan without summer terms (Plan II), or two years on the full-time plan (Plan III). In any case, he will need 60 weeks of academic work and 20 weeks of student teaching.

THIRD YEAR - At Northeastern

Term 8				Term 8A				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
21-11	Human Dev. I	3	3		Elective	4	4	21-52	Human Dev. II	3	3
21-31	18th Cent. Eur.	4	4		Elective	4	4	23-12	19th Cent. Eur.	4	4
21-61	Prin. Soc.	4	4		Elective	4	4	26-02	Prin. Soc.	4	4
21-91	Public Speaking	4	4		Elective	4	4	20-07	Ec. Prin. & Prob.	4	4
21-06	Ec. Prin. & Prob.	4	4						Elective	4	4
		19	19			16	16			19	19

FOURTH YEAR

Term 10*				Term 11				Term 12			
	Elective	8	4	21-53	Learn. & Teach. I	3	3	21-54	Learn. & Teach. II	3	3
	Elective	8	4	21-53S	Learn. & Teach. I			21-54S	Learn. & Teach. II		
					Sec. Lab.	0(2)	2		Sec. Lab.	0(2)	2
		16	8	23-17	Am. Hist. to 1820	4	4	23-18	The U.S. 1820-1890	4	4
				30-35	Am. Lit. to 1860	4	4	30-36	Am. Lit. after 1860	4	4
					Elective	4	4		Elective	4	4
						15(2)	17			15(2)	17

FIFTH YEAR

Term 13*				Term 14				Term 15			
	Elective	8	4	30-33	Surv. Eng. Lit.	4	4	30-34	Surv. Eng. Lit.	4	4
	Elective	8	4	21-55	Backgrounds of Am. Ed. I	3	3	21-56	Backgrounds of Am. Ed. II	3	3
		16	8	21-28	Meth. & Mat. Ind. Arts	3	3	21-58	Meas. & Eval. of Learning	3	3
					Elective	4	4		Elective	4	4
					Elective	4	4		Elective	4	4
						18	18			18	18

Terms 14A and 15A (2 terms)*

21-40 Student Teaching and

Related Seminar 14 Credits

Summer Term - 5 weeks. () indicate laboratory hours.

21-40 Student Teaching (14 credits) is required during both co-operative work periods of the senior year.

THE COLLEGE OF BUSINESS ADMINISTRATION

Policy

The College of Business Administration offers programs of study to meet the needs of young men and women who are preparing for future business, industrial, and civic leadership and who seek to acquire professional competence in fields of their own choosing.

The first objective imposes the obligation upon the program of study to illuminate for the student the society in which he lives, the culture to which he is heir and trustee, and the challenges posed for himself and his country.

The second objective imposes the obligation to impart the nature of the professional obligation, the role of the professional in society, and the fundamental skills whose proper use justify the title "professional."

To accomplish these objectives the programs of study assimilate principles of modern business management and administration and integrate these with courses in the liberal arts—English (literature, writing and speaking), history, and philosophy, and the social sciences, all of which are integral and essential components of each curriculum. In addition, fundamental skills and tool subjects are dealt with in their relations to the broader context of the business firm, its role, its responsibility, and its problems.

The academic content of the different curricula in the College of Business Administration is divided roughly as follows: one quarter in liberal arts other than the social sciences, one quarter in the social sciences, one quarter in a special branch of business, and one quarter in related business subjects. Since periods of probation and apprenticeship are inherent in the nature of positions at the administrative level, the Northeastern programs based on the Co-operative Plan of Education are especially significant.

Aims

In keeping with the current trends in collegiate education, the educational policy of the College has the following aims:

First: To develop attitudes and ideals that are ethically sound and socially desirable.

Second: To develop the habits of accurate thinking that are essential to sound judgment.

Third: To provide a thorough knowledge of fundamental economic laws and an appreciation of the cultural and social foundations of western civilization.

Fourth: To build breadth of perspective and provide sufficient specialization to meet basic professional requirements.

Fifth: To offer a college program which will help students select the field of business activity best suited to their aptitudes. The Co-operative Plan is particularly effective in this respect.

Methods of Instruction

In the accomplishment of these aims, the College makes use of the lecture and recitation systems and the problem and case methods of instruction.

Introductory and basic tool courses are, for the most part, presented on a lecture-problem basis. A large proportion of the classwork of the upperclass years consists of discussion, analysis, and reports on specific business problems and cases.

Students are encouraged to analyze propositions, to challenge unsupported assertions, to think independently, and to support their thinking with logic and facts. Frequent verbal and written reports are required.

Admission Requirements

Applicants for admission to the freshman class must qualify by graduation from an approved course of study in an accredited secondary school, including prescribed subjects listed on page 31.

Graduation Requirements

Students may qualify for the degree of Bachelor of Science in Business Administration in one of the following areas of concentration: accounting, business management, finance and insurance, industrial relations, and marketing.

Candidates for the Bachelor of Science degree must complete all of the prescribed work of the curriculum in which they seek to qualify. Students who undertake co-operative work assignments must also meet the requirements of the Department of Co-operative Education before they become eligible for their degrees.

Students transferring from another college or university are not eligible to receive the Bachelor of Science degree until they have completed at least one academic year at Northeastern immediately preceding their graduation.

Scholarship Requirements

The degree conferred not only represents the formal completion of the subjects in the selected course of study but also indicates professional competence in the designated area of concentration. An over-all average grade of C is required for graduation.

Graduation with Honor

Candidates who have achieved distinctly superior attainment in their academic work will be graduated with honor. Upon special vote of the faculty a limited number of this group may be graduated with high honor or with highest honor. Students must have been in attendance at the University at least three years before they may become eligible for honors at graduation.

Thesis Option

Theses are not required of candidates for the degree of Bachelor of Science in Business Administration. Students who show special aptitude for thesis work, however, may be permitted to substitute an appropriate thesis for equivalent work in class. Such permission must be obtained by the candidate from the Dean of the College.

The Programs of Study

First Year

The thirty weeks of the freshman year are primarily devoted to a survey of the economic and social institutions that underlie the conduct of business. In addition, accounting and English are given important positions in the program of this first year because of their fundamental significance as tools of communication for the businessman.

Other courses are provided to enrich the student's background in such fields as the physical sciences and the cultural foundations of our civilization.

In addition to regularly scheduled orientation meetings with the Dean of Freshmen, throughout the freshman year each student has the friendly counsel and guidance of a faculty adviser whose aim is to help bridge the gap between high school and college.

Upperclass Years

Under the Northeastern five-year Co-operative Plan, the alternation of work and classroom study starts with the second year. During this year all students continue with a common program, a major portion of which is devoted to courses which are introductory to the functional areas of business operation.

At the end of the second year, at the close of Term 6, students formally elect their areas of concentration in accordance with their individual interests and aptitudes. To help make this choice a student may obtain professional advice in Northeastern's Center for Guidance and Counseling.

During the remaining three years, specific required courses are taken in the area of concentration elected by each student in addition to a common core of course work in the liberal arts and general business.

The Areas of Concentration

Students are required to select an area of concentration before the end of their sophomore year. A brief statement of the nature of the vocational opportunities in the various fields is presented below. It is well for the prospective student to observe that employment after graduation and success in the business world are seldom determined solely by the student's chosen area of concentration.

I. Accounting-This service is demanded by business, commerce, industry, and government. Better known among the wide variety of titles applicable to the type of position in which accounting ability is primary, are public and private accountant, controller, cost accountant, auditor, and financial accountant. Many other vocational opportunities are available wherein accounting ability is a significant but not necessarily a primary requisite such as: credit manager, adjuster, investigator.

II. Business Management-This area of concentration appeals to the student who is more interested in the preparation for general business administration and operation rather than any of the more specialized areas of concentration. Positions are available to graduates of this program in commercial, manufacturing, and service businesses. Production planning and control, industrial purchasing and sales, cost control, methods analysis, time study, industrial safety, personnel management, self-employment, and many other vocational opportunities are available.

III. Finance and Insurance-A wide variety of vocational opportunities are available in financial institutions and the many governmental agencies regulating their operations. Any list of these organizations must include banks, insurance companies, investment houses, credit concerns, financial service institutions, mortgage companies, national and local real estate brokerage firms, and appraisers.

IV. Industrial Relations-Opportunities exist in the field of labor-management relations for those who are qualified. Both unions and management offer positions in personnel, bargaining, wage administration, and public relations. The Government, too, has openings for men and women who are trained in this field.

V. Marketing-Opportunities exist in the fields of merchandising, advertising, marketing administration, sales and research on both national and international levels, and in areas of industrial and consumer products.

Selling leadership and sales initiative put into motion the series of events which result in a purchase by the consumer. With proper training in the fertile fields of marketing administration and sales stimulation, the student gifted with imagination and ambition faces the prospect of a vital and rewarding future.

Curriculum in Accounting

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
20-01	Ec. Geog.	3	3	20-02	Ec. Geog.	3	3	20-04	Intro. to Ec.	3	3
17-01	Surv. Phys. Sci.	3	3	17-02	Surv. Phys. Sci.	3	3	17-03	Surv. Phys. Sci.	3	3
41-01	Prin. of Acct.	2(2)	3	41-02	Prin. of Acct.	2(2)	3	41-03	Prin. of Acct.	2(2)	3
27-21	Found. West. Culture	4	4	27-22	Found. West. Culture	4	4	27-23	Found. West. Culture	4	4
16-10	Phys. Ed. or			16-11	Phys. Ed. or			16-12	Phys. Ed. or		
61-01	ROTC (Basic)	<u>15</u> <u>(2)</u> <u>16</u>		61-02	ROTC (Basic)	<u>15</u> <u>(2)</u> <u>16</u>		61-03	ROTC (Basic)	<u>15</u> <u>(2)</u> <u>16</u>	

SECOND YEAR

Term 4 st				Term 5				Term 6			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-04	Intro. to Lit.	5	2-1/2	41-24	Managerial Acct.	3	3	41-27	Acct. Statements	3	3
17-04a	Surv. Phys. Sci.	5	2-1/2	44-20	Intro. to Fin.	3	3	44-22	Prin. of Ins.	3	3
27-24	Found. West. Culture	5	2-1/2	45-21	Prin. of Bus. Mgt.	3	3	45-22	Prin. of Bus. Mgt.	3	3
				43-23	Marketing I	3	3	43-24	Marketing II	3	3
				25-01	Intro. Psych.	4	4	25-02	Gen. Psych.	4	4
		<u>15</u>	<u>7-1/2</u>			<u>16</u>	<u>16</u>			<u>16</u>	<u>16</u>

THIRD YEAR

Term 7 th				Term 8				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
20-13	Ec. Prin.	8	4	20-37	Ec. Prin.	3	3	20-38	Ec. Prin.	3	3
26-07	Soc. Probs. or	8	4	29-01	Public Speaking	3	3	29-02	Public Speaking	3	3
14-41	Fund. of Math. I	8	4	44-31	Bus. Finance	4	4	44-32	Bus. Finance	4	4
				41-37	Inter. Acct.	3	3	41-38	Inter. Acct.	3	3
				41-31	Cost Acct.	3	3	41-32	Cost. Acct.	3	3
		<u>16</u>	<u>8</u>			<u>16</u>	<u>16</u>			<u>16</u>	<u>16</u>

FOURTH YEAR

Term 10 th				Term 11				Term 12			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
24-40s	El. of Phil.	5	2-1/2	20-18	Am. Ec. Hist.	4	4	20-21	Statistics	4	4
	Elective	5	2-1/2	20-20	Statistics	4	4	46-42	Leg. Asp. of Bus. II	3	3
	Elective	5	2-1/2	46-41	Leg. Asp. of Bus. I	3	3	30-17	Literature	3	3
				41-45	Adv. Acct.	3	3	41-47	Consol. State.	3	3
				41-55	Adv. Acct.	3	3	41-56	Role of Acct. in Decision-Making	3	3
		<u>15</u>	<u>7-1/2</u>			<u>17</u>	<u>17</u>			<u>16</u>	<u>16</u>

FIFTH YEAR

Term 13 th				Term 14				Term 15			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
24-41s	Prob. of Phil.	5	2-1/2	20-40	Bus. & Gov.	4	4	20-28	Ec. Systems or	4	4
	Elective	5	2-1/2	46-57	Law of Corp. Fin. & Ins.	4	4	20-65	Res. Meth.	4	4
	Elective	5	2-1/2	46-53	Basic Fed. Taxes	3	3	46-54	Basic Fed. Taxes	3	3
				41-43	Auditing	3	3	41-44	Auditing	3	3
				41-61	Sem. in Acct.	2	2	41-62	Sem. in Acct.	2	2
				50-10	Place. Tech.	2	1	30-48	Mod. Drama	4	4
		<u>15</u>	<u>7-1/2</u>			<u>18</u>	<u>17</u>			<u>16</u>	<u>16</u>

st Summer term - 5 weeks.

() indicate laboratory hours.

Curriculum in Business Management

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
20-01	Ec. Geog.	3	3	20-02	Ec. Geog.	3	3	20-04	Intro. to Ec.	3	3
17-01	Surv. Phys. Sci.	3	3	17-02	Surv. Phys. Sci.	3	3	17-03	Surv. Phys. Sci.	3	3
41-01	Prin. of Acct.	2(2)	3	41-02	Prin. of Acct.	2(2)	3	41-03	Prin. of Acct.	2(2)	3
27-21	Found. West. Culture	4	4	27-22	Found. West. Culture	4	4	27-23	Found. West. Culture	4	4
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
61-01	ROTC (Basic)	15(2)16		61-02	ROTC (Basic)	15(2)16		61-02	ROTC (Basic)	15(2)16	

SECOND YEAR

Term 4 ^a				Term 5				Term 6			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-04	Intro. to Lit.	5	2-1/2	41-24	Managerial Acct.	3	3	41-27	Acct. Statements	3	3
17-04a	Surv. Phys. Sci.	5	2-1/2	44-20	Intro. to Fin.	3	3	44-22	Prin. of Ins.	3	3
27-24	Found. West. Culture	5	2-1/2	45-21	Prin. of Bus. Mgt.	3	3	45-29	Prin. of Bus. Mgt.	3	3
				43-23	Marketing I	3	3	43-24	Marketing II	3	3
				25-01	Intro. Psych.	4	4	25-02	Gen. Psych.	4	4
		15	7-1/2			16	16			16	16

THIRD YEAR

Term 7 ^a				Term 8				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
20-13	Ec. Prin.	8	4	20-37	Ec. Prin.	3	3	20-38	Ec. Prin.	3	3
26-07	Soc. Prob.	8	4	44-31	Bus. Finance	4	4	44-32	Bus. Finance	4	4
	or			29-01	Public Speaking	3	3	29-02	Public Speaking	3	3
14-41	Fund. of Math. I	8	4	25-35a	Ind. Psych.	3	3	25-36a	Ind. Psych.	3	3
				45-35	Prod. Mgt.	3	3	45-36	Pers. Mgt.	3	3
		16	8			16	16			16	16

FOURTH YEAR

Term 10 ^a				Term 11				Term 12			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
41-33	Cost for Mgt.	5	2-1/2	20-20	Statistics	4	4	20-21	Statistics	4	4
	Elective	5	2-1/2	20-18	Am. Ec. Hist.	4	4	23-06	Rec. Eur. Hist.	3	3
	Elective	5	2-1/2	46-41	Leg. Asp. of Bus. I	3	3	46-42	Leg. Asp. of Bus. II	3	3
				24-40	El. of Phil.	3	3	24-41	Prob. of Phil.	3	3
				45-37	Pers. Mgt.	3	3	20-26	Labor Ec.	3	3
		15	7-1/2			17	17			16	16

FIFTH YEAR

Term 13 ^a				Term 14				Term 15			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
41-42	Budget Proc.	5	2-1/2	20-40	Bus. & Gov.	4	4	20-28	Ec. Systems	4	4
	Elective	5	2-1/2	43-43	Mktg. Res.	3	3		or		
	Elective	5	2-1/2	45-52	Mgt. of Sales	2	2	20-65	Res. Meth.	4	4
				45-61	Sem. in Mgt.	3	3	46-56	Law of Merch.	4	4
				30-47	Mod. Novel	4	4	30-48	Mod. Drama	4	4
				50-10	Place. Tech.	2	1	45-62	Sem. in Mgt.	4	4
		15	7-1/2			18	17			16	16

^a Summer term - 5 weeks. () indicate laboratory hours.

Curriculum in Finance and Insurance

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
20-01	Ec. Geog.	3	3	20-02	Ec. Geog.	3	3	20-04	Intro. to Ec.	3	3
17-01	Surv. Phys. Sci.	3	3	17-02	Surv. Phys. Sci.	3	3	17-03	Surv. Phys. Sci.	3	3
41-01	Prin. of Acct.	2(2)	3	41-02	Prin. of Acct.	2(2)	3	41-03	Prin. of Acct.	2(2)	3
27-21	Found. West. Culture	4	4	27-22	Found. West. Culture	4	4	27-23	Found. West. Culture	4	4
16-10	Phys. Ed. or			16-11	Phys. Ed. or			16-12	Phys. Ed. or		
61-01	ROTC (Basic)	$\overline{15} \overline{(2)} \overline{16}$		61-02	ROTC (Basic)	$\overline{15} \overline{(2)} \overline{16}$		61-03	ROTC (Basic)	$\overline{15} \overline{(2)} \overline{16}$	

SECOND YEAR

Term 4 ^a				Term 5				Term 6			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-04	Intro. to Lit.	5	2-1/2	41-24	Managerial Acct.	3	3	41-27	Acct. State.	3	3
17-04a	Surv. Phys. Sci.	5	2-1/2	44-20	Intro. to Fin.	3	3	44-22	Prin. of Ins.	3	3
27-24	Found. West. Culture	5	2-1/2	45-21	Prin. of Bus. Mgt.	3	3	45-22	Prin. of Bus. Mgt.	3	3
				43-23	Marketing I	3	3	43-24	Marketing II	3	3
				25-01	Intro. Psych.	4	4	25-02	Gen. Psych.	4	4
		$\overline{15}$	$\overline{7-1/2}$			$\overline{16}$	$\overline{16}$			$\overline{16}$	$\overline{16}$

THIRD YEAR

Term 7 ^a				Term 8				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
20-13	Ec. Prin.	8	4	20-37	Ec. Prin.	3	3	20-38	Ec. Prin.	3	3
26-07	Soc. Prob. or	8	4	44-31	Bus. Finance	4	4	44-32	Bus. Finance	4	4
14-41	Fund. of Math. I	8	4	44-33	Life Ins.	3	3	44-34	Prop. & Cas. Ins.	3	3
				29-01	Public Speaking	3	3	29-02	Public Speaking	3	3
				44-35	Estate Plan and Tax.	3	3	44-36	Estate Plan. and Tax.	3	3
		$\overline{16}$	$\overline{8}$			$\overline{16}$	$\overline{16}$			$\overline{16}$	$\overline{16}$

FOURTH YEAR

Term 10 ^a				Term 11				Term 12			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
24-40s	El. of Phil.	5	2-1/2	20-20	Statistics	4	4	20-21	Statistics	4	4
	Elective	5	2-1/2	20-18	Am. Ec. Hist.	4	4	20-51a	Pub. Fin.	3	3
	Elective	5	2-1/2	46-41	Leg. Asp. of Bus. I	3	3	46-42	Leg. Asp. of Bus. II	3	3
				44-41	Invest. I	3	3	44-42	Invest. II	3	3
				20-24a	Mon. & Bkg.	3	3	30-17	Literature	3	3
		$\overline{15}$	$\overline{7-1/2}$			$\overline{17}$	$\overline{17}$			$\overline{16}$	$\overline{16}$

FIFTH YEAR

Term 13 ^a				Term 14				Term 15			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
24-41s	Prob. of Phil.	5	2-1/2	20-40	Bus. & Gov.	4	4	20-28	Ec. Systems	4	4
	Elective	5	2-1/2	46-57	Law of Corp. Fin. & Ins.	4	4	20-65	Res. Meth.	4	4
	Elective	5	2-1/2	44-52	Sec. Mkts.	3	3	44-62	Seminar in Fin. and Ins.	4	4
				44-61	Seminar in Fin. and Ins.	2	2	20-25	Bus. Cycles	4	4
				23-06	Rec. Eur. Hist.	3	3	30-48	Mod. Drama	4	4
				50-10	Place. Tech.	2	1				
		$\overline{15}$	$\overline{7-1/2}$			$\overline{18}$	$\overline{17}$			$\overline{16}$	$\overline{16}$

^a Summer term - 5 weeks. () indicate laboratory hours.

Curriculum in Industrial Relations

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
20-01	Ec. Geog.	3	3	20-02	Ec. Geog.	3	3	20-04	Intro. to Ec.	3	3
17-01	Surv. Phys. Sci.	3	3	17-02	Surv. Phys. Sci.	3	3	17-03	Surv. Phys. Sci.	3	3
41-01	Prin. of Acct.	2(2)	3	41-02	Prin. of Acct.	2(2)	3	41-03	Prin. of Acct.	2(2)	3
27-21	Found. West. Culture	4	4	27-22	Found. West. Culture	4	4	27-23	Found. West. Culture	4	4
16-10	Phys. Ed. or			16-11	Phys. Ed. or			16-12	Phys. Ed. or		
61-01	ROTC (Basic)	15(2)16		61-02	ROTC (Basic)	15(2)16		61-03	ROTC (Basic)	15(2)16	

SECOND YEAR

Term 4*				Term 5				Term 6			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-04	Intro. to Lit.	5	2-1/2	41-24	Managerial Acct.	3	3	41-27	Acct. State.	3	3
17-04a	Surv. Phys. Sci.	5	2-1/2	44-20	Intro. to Fin.	3	3	44-22	Prin. of Ins.	3	3
27-24	Found. West. Culture	5	2-1/2	45-21	Prin. of Bus. Mgt.	3	3	45-22	Prin. of Bus. Mgt.	3	3
				43-23	Marketing I	3	3	43-24	Marketing II	3	3
				25-01	Intro. Psych.	4	4	25-02	Gen. Psych.	4	4
		15	7-1/2			16	16			16	16

THIRD YEAR

Term 7*				Term 8				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
20-13	Ec. Prin.	8	4	20-37	Ec. Prin.	3	3	20-38	Ec. Prin.	3	3
26-07	Soc. Prob. or	8	4	44-31	Bus. Finance	4	4	44-32	Bus. Finance	4	4
14-41	Fund. of Math. I	8	4	29-01	Public Speaking	3	3	29-02	Public Speaking	3	3
				45-35	Prod. Mgt.	3	3	45-36	Pers. Mgt.	3	3
				25-35a	Ind. Psych.	3	3	25-36a	Ind. Psych.	3	3
		16	8			16	16			16	16

FOURTH YEAR

Term 10*				Term 11				Term 12			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
41-33	Cost for Mgt.	5	2-1/2	20-20	Statistics	4	4	20-21	Statistics	4	4
	Elective	5	2-1/2	20-18	Am. Ec. Hist.	4	4	20-26	Labor Ec.	3	3
	Elective	5	2-1/2	46-41	Leg. Asp. of Bus. I	3	3	46-42	Leg. Asp. of Bus. II	3	3
				45-37	Pers. Mgt.	3	3	23-06	Rec. Eur. Hist.	3	3
				24-40	El. of Phil.	3	3	24-41	Prob. of Phil.	3	3
		15	7-1/2			17	17			16	16

FIFTH YEAR

Term 13*				Term 14				Term 15			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
41-42	Bud. Proc.	5	2-1/2	20-40	Bus. & Gov.	4	4	20-28	Ec. Systems or	4	4
	Elective	5	2-1/2	46-55	Labor Law	3	3	20-65	Res. Meth.	4	4
	Elective	5	2-1/2	42-52	Mot. & Time	1(2)	2	26-17	Urban Soc.	4	4
				45-61	Sem. in Policy and Org.	3	3	42-62	Sem. Coll. Barg.	4	4
				30-47	Mod. Novel	4	4	20-25	Bus. Cycles	4	4
				50-10	Place. Tech.	2	1				
		15	7-1/2			17(2)17				16	16

* Summer term - 5 weeks. () indicate laboratory hours.

Curriculum in Marketing

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
20-01	Ec. Geog.	3	3	20-02	Ec. Geog.	3	3	20-04	Intro. to Ec.	3	3
17-01	Surv. Phys. Sci.	3	3	17-02	Surv. Phys. Sci.	3	3	17-03	Surv. Phys. Sci.	3	3
41-01	Prin. of Acct.	2(2)	3	41-02	Prin. of Acct.	2(2)	3	41-03	Prin. of Acct.	2(2)	3
27-21	Found. West. Culture	4	4	27-22	Found. West. Culture	4	4	27-23	Found. West. Culture	4	4
16-10	Phys. Ed. or			16-11	Phys. Ed. or			16-12	Phys. Ed. or		
61-01	ROTC (Basic)	15	16	61-02	ROTC (Basic)	15	16	61-03	ROTC (Basic)	15	16

SECOND YEAR

Term 4 ^a				Term 5				Term 6			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
30-04	Intro. to Lit.	5	2-1/2	41-24	Managerial Acct.	3	3	41-27	Acct. State.	3	3
17-04a	Surv. Phys. Sci.	5	2-1/2	44-20	Intro. to Fin.	3	3	44-22	Prin. of Ins.	3	3
27-24	Found. West. Culture	5	2-1/2	45-21	Prin. of Bus. Mgt.	3	3	45-22	Prin. of Bus. Mgt.	3	3
				43-23	Marketing I	3	3	43-24	Marketing II	3	3
				25-01	Intro. Psych.	4	4	25-02	Gen. Psych.	4	4
		15	7-1/2			16	16			16	16

THIRD YEAR

Term 7 ^a				Term 8				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
20-13	Ec. Prin.	8	4	20-37	Ec. Prin.	3	3	20-38	Ec. Prin.	3	3
26-07	Soc. Problems or	8	4	29-01	Public Speaking	3	3	29-02	Public Speaking	3	3
14-41	Fund. of Math. I	8	4	43-35	Marketing Mgt. I	3	3	43-36	Marketing Mgt. II	3	3
				43-37	Sales Mgt.	3	3	43-40	Advtg. Prod.	3	3
				44-31	Bus. Finance	4	4	44-32	Bus. Finance	4	4
		16	8			16	16			16	16

FOURTH YEAR

Term 10 ^a				Term 11				Term 12			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
24-40s	El. of Phil.	5	2-1/2	20-20	Statistics	4	4	20-21	Statistics	4	4
	Elective	5	2-1/2	20-18	Am. Ec. Hist.	4	4	43-44	For. Mktg.	3	3
	Elective	5	2-1/2	46-41	Leg. Asp. of Bus. I	3	3	46-42	Leg. Asp. of Bus. II	3	3
				43-42	Mktg. Policy	3	3	30-17	Literature	3	3
				43-43	Mktg. Res. I	3	3	43-45	Mktg. Res. II	3	3
		15	7-1/2			17	17			16	16

FIFTH YEAR

Term 13 ^a				Term 14				Term 15			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
24-41s	Prob. of Phil.	5	2-1/2	20-40	Bus. & Gov.	4	4	20-28	Ec. Systems	4	4
	Elective	5	2-1/2	43-50	Ind. Mktg.	2	2		or		
	Elective	5	2-1/2	43-52	Ret. Merch.	3	3	20-65	Res. Meth.	4	4
				30-47	Mod. Novel	4	4	46-56	Law of Merch.	4	4
				23-06	Rec. Eur. Hist.	3	3	43-60	Mktg. Controls	4	4
				50-10	Place. Tech.	2	1	43-62	Seminar in Mktg. Theory	4	4
		15	7-1/2			18	17			16	16

^a Summer term - 5 weeks.

() indicate laboratory hours.

THE COLLEGE OF ENGINEERING

Aims and Methods

It is the purpose of the College of Engineering to provide educational programs which will effectively prepare students to become professional practitioners, to enter graduate schools, or to accept employment in the many industrial fields in which an engineering background is helpful. Principally concerned with undergraduate instruction, the College is operated upon the Co-operative Plan and offers five-year curricula leading to the baccalaureate degree in civil, mechanical, electrical, chemical, and industrial engineering.

The academic program begins with a 30-week freshman year of full-time study during which the student continues to build the foundation in mathematics, the physical sciences, and means of expression that were begun in high school. Co-operative work in the same general field of engineering for which he is preparing begins with the second year and continues throughout the upperclass program. Thus the student has an opportunity to gain some insight into problems of actual engineering practice as he progresses through the course of study at the College.

In keeping with recent trends in engineering education, the co-operative curricula at Northeastern comprise a balanced sequence of courses in which the technological disciplines occupy about four fifths of the student's program and the humanistic or general studies about one fifth. These two aspects of the undergraduate curriculum are integrated throughout the entire five years so that growth in cultural understanding proceeds hand in hand with development of technical knowledge and skill. This plan, widely utilized in engineering education, is quite different from that in legal or medical education, in which the general studies precede the professional training, but it has proved to be highly effective in the preparation of engineers and industrial leaders.

The courses of study in the first year are identical for all engineering students, and it is possible for a student to change his curriculum at the end of the freshman year without loss of time. Emphasis throughout all curricula is laid upon fundamental concepts and skills so that the student may develop an adequate foundation upon which to base his professional development. In the undergraduate programs relatively little time can be devoted to courses in specialized aspects of current engineering practice. These must in the main be given in graduate schools, where specialization is appropriate and possible.

Undergraduate curricula at Northeastern are designed to develop young men and women with well-balanced personal qualities, a sense of civic responsibility, an understanding of industrial job requirements, and a technical competence sufficient to begin a professional career. Instruction both in the classroom and in the laboratory is designed to place maximum emphasis upon individual initiative and responsibility and to develop the student's powers of analysis.

Because an engineering education teaches the student to search out the truth, to think clearly, and to formulate conclusions based upon a solid foundation of facts, engineers are being called upon more and more to occupy positions

of responsibility in the management of our great industrial enterprises. Even in such diverse fields as banking, public health, and public administration, this so-called engineering approach is in demand.

Day graduate programs are available in the Departments of Chemical, Civil, Mechanical, and Electrical Engineering, and of Physics leading to the master's degree. The former are co-operative programs in engineering similar to the undergraduate co-operative programs. In Physics, conventional two-year half-time fellowships are available.

Part-Time Program Offered During Evening Hours

The College of Engineering also offers a nine-year curriculum leading to the degree of Bachelor of Science in Electrical Engineering. Classes are held in the evening and Saturday mornings. Admission requirements and course requirements are the same as for the degree under the Co-operative Plan. For further information consult the Evening Bulletin of the College of Engineering.

Admission Requirements

Applicants for admission to the freshman class must qualify by graduation from an approved course of study in an accredited secondary school, including the prescribed subjects listed on page 31.

Graduation Requirements

The College of Engineering offers five-year curricula, conducted on the Co-operative Plan, leading to the following degrees:

1. Bachelor of Science in Civil Engineering
2. Bachelor of Science in Mechanical Engineering
3. Bachelor of Science in Electrical Engineering
4. Bachelor of Science in Chemical Engineering
5. Bachelor of Science in Industrial Engineering

These curricula are described in the following pages. Since the first year is the same for all engineering students, final choice of curriculum need not be made until the beginning of the second year.

Candidates for the Bachelor of Science degree must complete all of the prescribed work of the curriculum in which they seek to qualify. A total of 232 credit hours (equivalent to 145 semester hours) is required for the degree. Students who undertake co-operative work assignments must meet the requirements of the Department of Co-operative Education before they become eligible for their degrees.

No student transferring from another college or university is eligible to receive the Bachelor of Science degree until he has completed at least one academic year at Northeastern immediately preceding his graduation.

Scholarship Requirements

The degree conferred not only represents the formal completion of the subjects in the selected course of study but also indicates professional competence in the designated field of specialization. Those who are clearly unable to meet the accepted standard of attainment will be required to withdraw from the University.

Graduation with Honor

Candidates of distinctly superior achievement in their academic work will be graduated with honor. Upon special vote of the faculty a limited number of this group may be graduated with high honor or with highest honor. Students must have been in attendance at the University at least three years before they may become eligible for honors at graduation.

Engineering Curricula

A brief description of each of the five engineering curricula, together with a short statement as to the principal vocational opportunities available to graduates, is given below to assist students in choosing their fields of specialization.

I. Civil Engineering has to do with the planning and building of all kinds of structures and public works. None of the structures of civil engineers lend themselves to quantity production in a factory. Not only are civil engineering works designed to fit a single location, but ordinarily their value is dependent upon their ability to resist forces tending to move them.

Civil engineering is as old as civilization itself and, until recent times, it embraced all phases of engineering except those of a military character. Today its major branches include topographical, municipal, railroad, highway, structural, hydraulic, and sanitary engineering. It covers land surveying, soil mechanics, the building of railroads, harbors, docks, and similar structures; the construction of sewers, water works, streets, and highways; the design and construction of flood control projects, bridges, buildings, walls, foundations, and of all fixed structures.

Since the first step in every civil engineering project involves accurate measurement of the surface features of the land, of the nature of the soil, and of the character of the underlying rock, the study of surveying and related subjects occupies a large place in the civil engineering curriculum. And since the primary consideration in designing any structure is to make certain that it will withstand safely any force to which it may be subjected, the mechanics of static bodies, strength of materials, and theory of structures are studied in detail. The curriculum is thus intended to prepare the young civil engineer to take up the work of design and construction of structures, to solve the problems of water supply and waste disposal in urban areas, and intelligently to undertake the supervision of work in allied fields of engineering and in general contracting.

Upon graduation, the young engineer may expect a period of apprenticeship either in the field, surveying and plotting, or in the office, over the drafting board. As experience is gained, the graduate is entrusted with greater responsibilities in actual design and supervision of construction. Those who prefer a roving existence should direct their ambitions toward private fields, while those who prefer a stable home and community life will seek opportunities in the public service of the Federal Government and the various states and municipalities.

II. Mechanical Engineering is concerned with the harnessing of power resources by means of machinery to perform useful work. With the increasing mechanization of all industry which has taken place during the last century, the field has so broadened as to include all lines of industry.

In contrast to the civil engineer, who deals primarily with static forces, the mechanical engineer is more concerned with the mechanics of motion or kinetics. And because moving parts require constant care and adjustment, the mechanical engineer has the task not only of designing and installing complicated machinery but also of operating it efficiently after it has been installed.

The construction and operation of furnaces, boilers, and engines, the design of all kinds of machinery from pocket watches to steel boring mills, the construction and operation of railway and other transportation equipment including automobiles and airplanes, and even control of atmospheric conditions by means of heating and air conditioning equipment, all fall within the field of mechanical engineering.

Since machinery is so predominantly the concern of the mechanical engineer, the program of study is designed to give the student considerable training in the principles underlying the design and operation of engines, power transmission devices, machine tools, and other machinery. This, of course, implies a thorough study of the physical laws concerning motion and transfer of energy. Applied mechanics and thermodynamics occupy a prominent place in the curriculum. The program of instruction thus gives the student a broad foundation in those fundamental subjects essential to all engineering practice and, in the senior year, provides for limited specialization.

For those students desiring to specialize in the field of industrial management, attention is called to the curriculum in industrial engineering, the basic training of which is essentially the same as that in mechanical engineering.

The graduate mechanical engineer generally finds employment in an industrial plant, either in design and research or in plant operation and maintenance. And if his abilities lie in that direction, he frequently is entrusted after a time with greater and greater responsibility for the successful management of the enterprise.

III. Electrical Engineering is a fast-moving field, obtaining much of its impetus from the contemporary pioneering developments in the pure sciences. For this reason, the program of study in electrical engineering includes more work in physics and mathematics than do the other programs and provides a solid grounding in engineering fundamentals as well.

The field of electrical engineering, and the electrical industry which it serves, are usually divided into two main areas—power and communications. These areas overlap in that both are concerned with electronics and control. The electrical engineering curriculum therefore, includes courses in the generation, transmission, and distribution of electrical energy for light and power purposes; the design and development of communications equipment such as telephones, radio, television, and radar; the development and operation of large-scale data-processing equipment and analog and digital computers; servomechanisms, etc. To provide the abstract ground necessary for these undertakings, courses covering Laplace transforms, field theory, and solid-state physics are included.

The profession of electrical engineering affords a wide diversification of employment opportunities. If one is research-minded, opportunity to develop one's talents may be found in one of the great university or industrial laboratories; if one is interested in industrial applications or plant problems, opportunity can be found in the manufacturing or operating organizations; and if one is sales-minded, he may find a career as a sales engineer.

IV. Chemical Engineering has grown out of the discoveries in the chemical laboratories which have served as a foundation for a great many new industries whose production processes involve chemical as well as physical changes. Petroleum refining, coal carbonization, plastics, manufacture of nylon and cellophane, and hundreds of other industries require men and women trained in chemistry as well as in engineering. Moreover, much of the training received by the chemical engineer is now being applied in the rapidly developing field of nuclear engineering. Many older industries, such as foods, textiles, paints and varnishes, and leather, are also employing chemical engineers.

The chemical engineer has been defined as a "professional man experienced in the design, construction, and operation of plants in which materials undergo chemical and physical change." It is the task of the chemical engineer to reduce the costs, increase production, and improve the quality of the products in the industry.

In addition to the fundamental courses in chemistry, mathematics, and physics required of all engineering students, a considerable amount of time is devoted to more advanced work in chemistry as a foundation for the study of chemical technology. In recognition of the increasing interest in the production and utilization of nuclear energy, a course in modern physics and a course in the introduction to nuclear engineering recently have been added to the curriculum. Instruction in the elements of mechanical and electrical engineering also helps to give the student a sound engineering background. Since the field of chemical engineering is so varied, the curriculum has been designed to give the students a broad training in which fundamental principles are stressed. It is believed that this training will enable the students readily to acclimate themselves to whatever industry they may choose to enter.

Because of the complex nature of many chemical processes and because of the difficulty of translating laboratory results into full-scale plant operations, there has been developed in many chemical plants the so-called semi-works or pilot plant. Here new processes developed by the chemists in the research

laboratory are put to the test of actual plant conditions. And it is here that the young chemical engineers often find themselves upon graduation. If they are able to understand the chemist on the one side and the plant operator on the other, and if they are technically competent as well, they will soon find opportunities for advancement either in one of the technical branches of the industry, such as design, development, research, and production, or in the sales and management fields in which a knowledge of chemical engineering is essential.

V. Industrial Engineering is concerned with the application of engineering and scientific principles to the varied problems in the field of production management involving the intelligent utilization of men, materials, machines, and money.

About sixty years ago, Frederick W. Taylor undertook to apply to the problems of industrial management what we now call "the scientific method" or "the engineering approach." He reasoned that it was management's business to know what constituted a proper day's work and that the way to get the facts was through research and experiment on a scientific basis. He defined "scientific management" not as any device or scheme or gadget, but as a new outlook – a new viewpoint based upon a solid foundation of fact. The methods employed by Taylor and by those who came after him have undergone some modification, but the concept of scientific management which he formulated has gained wider and wider recognition from both employers and employees.

This growing recognition of the value of a scientific approach to the problems of industrial management early created a demand for men and women trained in engineering and science, who possessed a knowledge of business as well, to assume positions of administrative responsibility in industry. To meet this demand, courses were established in many engineering colleges to provide a thorough training in engineering fundamentals, together with a specialized training in business administration which would prepare the students for managerial responsibilities in technical industries. These curricula are variously entitled industrial engineering, administrative engineering, and engineering administration, and all are designed to lead ultimately to positions of administrative or executive responsibility, rather than to positions which involve highly specialized technical engineering responsibility.

The curriculum in industrial engineering, then, provides a course of study which is essentially the same as that for mechanical engineering in the first three years. In the last two years, however, advanced engineering courses are replaced by courses in business management.

Upon graduation, the young industrial engineer may find his way into such factory staff departments as methods engineering, production planning and control, wage administration, quality control, and time study. If he prefers, he may select work in cost accounting or statistical analysis; then again he may incline towards sales engineering activity and serve in the field as a sales and service representative.

More and more there is opportunity for the experienced industrial engineer to serve industry in a consulting capacity. Upon becoming especially skilled in his profession, he is called in by industry for assistance in the installation and maintenance of sound management principles, and in the reorganization of enterprises which have failed.

Curriculum in Civil Engineering

FIRST YEAR											
Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
01	Gen. Chem.	3(3)	4	11-02	Gen. Chem.	3(3)	4	11-03	Gen. Chem.	3(3)	4
51	Eng. Graphics I	3(3)	3	12-52	Eng. Graphics II	3(3)	3	12-53	Eng. Graphics III	3(3)	3
51	Math. I	5	4	14-52	Math. II	5	4	14-53	Math. III	5	5
51	Physics	3	3	15-52	Physics	3	3	15-53	Physics	3	3
01	English	3	3	30-02	English	3	3	30-03	English	3	3
10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
01	ROTC (Basic)			61-02	ROTC (Basic)			61-03	ROTC (Basic)		
		17(6)	17			17(6)	17			17(6)	18
COND YEAR											
Term 4*				Term 5				Term 6			
04	Gen. Chem.	3(3)	2	1-10	Surveying	3(3)	3	2-20	App. Mech.	4	4
54	Eng. Graphics IV	3(3)	2	3-01	Elect. Eng.	3	3	3-02	Elect. Eng.	3	3
54	Math. IV	5	2-1/2	14-05	Diff. Calc.	4	4	14-06	Int. Calc.	4	4
54	Physics	5	2-1/2	15-55	Physics	4(3)	5	15-56	Physics	3(3)	4
				22-04	Mod. Dem.	3	3	22-05	Mod. Dem.	3	3
		16(6)	9			17(6)	18			17(3)	18
THIRD YEAR											
Term 7*				Term 8				Term 9			
21	App. Mech.	6	3	1-11	Surveying	4(3)	4	1-12	Surveying	3(3)	3
15	Literature	6	3	2-22	Str. of Mat.	4	4	1-20	Hydraulics	3	3
07	Psychology	6	3	2-80	Heat Eng.	4	4	2-23	Str. of Mat.	3	3
	or			3-03	Elect. Eng.	3	3	14-07	Diff. Eq.	4	4
05	Rec. Am. Hist.	6	3	20-11	Economics	3	3	20-12	Economics	3	3
								44-13	Constr. Fin.	2	2
		18	9			18(3)	18			18(3)	18
FOURTH YEAR											
Term 10*				Term 11				Term 12			
13	Surveying	2(12)	3	1-21	Hydraulics	3	3	1-41	Struct. Anal.	4	4
16	Literature	6	3	1-40	Struct. Anal.	3	3	1-50	Concrete	3	3
08	Psychology	6	3	1-49	Conc. T. Lab.	1(4)	3	1-54	Des. of Struc.	2(4)	2
	or			2-24	Adv. Mech.	3	3	1-58	Eng. Geol.	3	3
06	Rec. Eur. Hist.	6	3	2-43	Mat. and Proc.	3	3	2-64	Test. Mat. Lab.	1(4)	3
					Lib. Elect.	3	3		Lib. Elect.	3	3
		14(12)	9			16(4)	18			16(8)	18
FIFTH YEAR											
Term 13*				Term 14				Term 15			
03	Eff. Speaking	6	3	1-24	San. Eng.	4	4	1-25	San. Eng.	3(3)	4
03	Contracts and Agency	6	3	1-30	Transport.	3	3	1-31	Transport.	2	2
	Lib. Elect.	6	3	1-42	Struct. Anal.	3	3	1-43	Struct. Anal.	4	4
				1-51	Concrete	4	4	1-56	Des. of Str.	0(9)	3
				1-55	Des. of Str.	3(6)	3	1-57	Found. Eng.	2	2
				50-01	Prof. Devel.	3	1	1-60	Cons. Costs	3	3
		18	9			20(6)	18			14(12)	18

Summer term - 5 weeks. () indicate laboratory hours.

Curriculum in Mechanical Engineering

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
11-01	Gen. Chem.	3(3)	4	11-02	Gen. Chem.	3(3)	4	11-03	Gen. Chem.	3(3)	4
12-51	Eng. Graphics I	3(3)	3	12-52	Eng. Graphics II	3(3)	3	12-53	Eng. Graphics III	3(3)	3
14-51	Math. I	5	4	14-52	Math. II	5	4	14-53	Math. III	5	5
15-51	Physics	3	3	15-52	Physics	3	3	15-53	Physics	3	3
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
61-01	ROTC (Basic)	<u>17(6)17</u>		61-02	ROTC (Basic)	<u>17(6)17</u>		61-03	ROTC (Basic)	<u>17(6)18</u>	

SECOND YEAR

Term 4 ^a				Term 5				Term 6			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
11-04	Gen. Chem.	3(3)	2	3-01	Elect. Eng.	3	3	2-20	App. Mech.	4	4
12-54	Eng. Graphics IV	3(3)	2	14-05	Diff. Calc.	4	4	3-02	Elect. Eng.	3	3
14-54	Math. IV	5	2-1/2	15-55	Physics	4(3)	5	14-06	Int. Calc.	4	4
15-54	Physics	5	2-1/2	22-04	Mod. Dem.	3	3	15-56	Physics	3(3)	4
				30-15	Literature	3	3	22-05	Mod. Dem.	3	3
		<u>16(6)9</u>				<u>17(3)18</u>				<u>17(3)18</u>	

THIRD YEAR

Term 7 ^a				Term 8				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
1-10	Surveying	6(6)	3	2-22	Str. of Mat.	4	4	1-20	Hydraulics	3	3
2-21	App. Mech.	6	3	2-81	Heat Eng.	4	4	2-13	Mechanism	3	3
25-07	Psychology	6	3	3-03	Elect. Eng.	3	3	2-23	Str. of Mat.	3	3
	or			14-07	Diff. Eq.	4	4	2-82	Heat Eng.	3	3
23-05	Rec. Am. Hist.	6	3	20-11	Economics	3	3	14-20	Adv. Math.	3	3
		<u>18(6)9</u>				<u>18 — 18</u>		20-12	Economics	3	3
										<u>18 — 18</u>	

FOURTH YEAR

Term 10 ^a				Term 11				Term 12			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
2-83	Heat Eng.	6	3	2-27	Fluid Mech.	3	3	2-24	Adv. Mech.	3	3
30-16	Literature	6	3	2-43	Mat. and Proc.	3	3	2-28	Fluid Mech.	3	3
25-08	Psychology	6	3	2-84	Heat Eng.	4	4	2-61	Mech. E. Lab.	0(3)	2
	or			2-60	Mech. E. Lab.	0(3)	2	2-85	Heat Eng.	4	4
23-06	Rec. Eur. Hist.	6	3	5-10	Ind. Mgt.	3	3	5-11	Ind. Mgt.	3	3
					Lib. Elect.	3	3		Lib. Elect.	3	3
		<u>18 — 9</u>				<u>16(3)18</u>				<u>16(3)18</u>	

FIFTH YEAR

Term 13 ^a				Term 14				Term 15			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
2-46	Metal Proc.	4(6)	3	2-14	Mach. Design	3(3)	4	1-48	Structures	3	3
29-03	Eff. Speaking	6	3	2-26	Eng. Dyn.	3	3		or		
	Lib. Elect.	6	3	2-29	Exp. Stress Anal.	4	4	2-86	Heat Eng.	3	3
					or			2-15	Mach. Design	3(3)	4
				2-87	Power Plant Eng.	4	4	2-44	Phys. Met.	3(3)	4
				2-62	Mech. E. Lab.	0(4)	3	2-63	Mech. E. Lab.	0(4)	3
				15-41	Nucl. Physics	3	3	2-89	Nucl. Eng.	4	4
				50-01	Prof. Devel.	3	1				
		<u>16(6)9</u>				<u>16(7)18</u>				<u>13(10)18</u>	

^a Summer term - 5 weeks. () indicate laboratory hours.

Curriculum in Electrical Engineering

FIRST YEAR											
Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
01	Gen. Chem.	3(3)	4	11-02	Gen. Chem.	3(3)	4	11-03	Gen. Chem.	3(3)	4
51	Eng. Graphics I	3(3)	3	12-52	Eng. Graphics II	3(3)	3	12-53	Eng. Graphics III	3(3)	3
51	Math. F	5	4	14-52	Math. II	5	4	14-53	Math. III	5	5
51	Physics	3	3	15-52	Physics	3	3	15-53	Physics	3	3
01	English	3	3	30-02	English	3	3	30-03	English	3	3
10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
01	ROTC (Basic)			61-02	ROTC (Basic)			61-03	ROTC (Basic)		
		17	(6)17			17	(6)17			17	(6)18
COND YEAR											
Term 4 ^a				Term 5				Term 6			
04	Gen. Chem.	3(3)	2	3-51	Elect. Eng.	3	3	2-20	App. Mech.	4	4
54	Eng. Graphics IV	3(3)	2	14-05	Diff. Calc.	4	4	3-52	Elect. Eng. II	3	3
54	Math. IV	5	2-1/2	15-55	Physics	4(3)	5	14-06	Int. Calc.	4	4
54	Physics	5	2-1/2	22-04	Mod. Dem.	3	3	15-56	Physics	3(3)	4
				30-15	Literature	3	3	22-05	Mod. Dem.	3	3
		16	(6)9			17	(3)18			17	(3)18
THIRD YEAR											
Term 7 ^a				Term 8				Term 9			
21	App. Mech.	6	3	2-22	Str. of Mat.	4	4	2-80	Heat Eng.	4	4
53	Elect. Eng. III	6	3	15-65	Solid State			3-19	Field Theo. I	3	3
07	Psychology	6	3		Phys. Elec.	3	3	3-70	Electronics I	3	3
	or			3-54	Elect. Eng. IV	4	3	14-20	Adv. Math.	3	3
05	Rec. Am. Hist.	6	3	14-07	Diff. Eq.	4	4	20-12	Economics	3	3
				20-11	Economics	3	3	30-16	Literature	3	3
		18	9			18	17			19	19
FOURTH YEAR											
Term 10 ^a				Term 11				Term 12			
90	Elect. E. Lab. I	(6)	3	3-15	Polyphase			3-55	Elect. Mach. I	3	3
80	Transients	6	3		A.C. Circ.	3	3	3-92	Elect. E. Lab. III	(3)	3
08	Psychology	6	3	3-91	Elect. E. Lab. II	(3)	3	3-93	Elect. E. Lab. IV	(3)	3
	or			3-29	Field Theo. II	3	3	3-39	Field Theo III	3	3
06	Rec. Eur. Hist.	6	3	3-71	Electronics II	3	3	3-72	Electronics III	3	3
				5-03	Ind. Mgt.	3	3		Lib. Elect.	3	3
					Lib. Elect.	3	3				
		12	(6)9			15	(3)18			12	(6)18
FIFTH YEAR											
Term 13 ^a				Term 14				Term 15			
94	Elect. E. Lab. V	(12)	6	3-56	Elect. Mach. II	3	3	3-57	Elect. Mach. III	3	3
	Lib. Elect.	6	3	3-73	Electronics IV	3	3	3-74	Electronics V	3	3
				3-28	Trans. Lines	4	4	3-32	Filters	3	3
				3-60	Servomech.	3	3	3-96	Elect. E. Lab. VII	(3)	3
				3-95	Elect. E. Lab. VI	(3)	4	29-03	Eff. Speaking	3	3
				50-01	Prof. Devel.	3	1	1-26	Fluid Mech.	3	3
		6	(12)9			16	(3)18			15	(3)18

Summer term - 5 weeks. () indicate laboratory hours.

Curriculum in Chemical Engineering

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
11-01	Gen. Chem.	3(3)	4	11-02	Gen. Chem.	3(3)	4	11-03	Gen. Chem.	3(3)	4
12-51	Eng. Graphics I	3(3)	3	12-52	Eng. Graphics II	3(3)	3	12-53	Eng. Graphics III	3(3)	3
14-51	Math. I	5	4	14-52	Math. II	5	4	14-53	Math. III	5	5
15-51	Physics	3	3	15-52	Physics	3	3	15-53	Physics	3	3
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
	or				or				or		
61-01	ROTC (Basic)	<u>17(6)17</u>		61-02	ROTC (Basic)	<u>17(6)17</u>		61-03	ROTC (Basic)	<u>17(6)18</u>	

SECOND YEAR

Term 4				Term 5				Term 6			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
11-05	Gen. Chem.	3(3)	2	11-51	Org. Chem.	3(3)	4	11-54	Org. Chem.	3(3)	4
4-50	Intro. to Chem. Eng.	4	2	14-05	Diff. Calc.	4	4	14-06	Int. Calc.	4	4
14-54	Math. IV	5	2-1/2	15-55	Physics	4(3)	5	15-56	Physics	3(3)	4
15-54	Physics	5	2-1/2	4-51	Chem. E. Lit.	1	1	2-20	App. Mech.	4	4
				22-04	Mod. Dem.	3	3	22-05	Mod. Dem.	3	3
		<u>17(3) 9</u>				<u>15(6)17</u>				<u>17(6)19</u>	

THIRD YEAR

Term 7 ^a				Term 8				Term 9			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
2-21	App. Mech.	6	3	2-22	Str. of Mat.	4	4	4-52	Chem. E. Calc.	4	4
4-60	Fluid Mech.	5(3)	3	11-61	Phys. Chem.	3(3)	4	11-62	Phys. Chem.	3(3)	4
25-07	Psychology	6	3	30-15	Literature	3	3	15-41	Intro. At. & Nucl. Phys.	4	4
	or			14-07	Diff. Eq.	4	4	14-20	Adv. Math.	3	3
23-05	Rec. Am. Hist.	6	3	20-11	Economics	3	3	20-12	Economics	3	3
		<u>17(3) 9</u>				<u>17(3)18</u>				<u>17(3)18</u>	

FOURTH YEAR

Term 10 ^a				Term 11				Term 12			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
4-70	Heat Trans.	5(3)	3	11-65	Phys. Chem.	3	3	11-56	Org. Chem.	3	3
29-03	Eff. Speaking	6	3	4-71	Chem. Eng.	4(4)	6	4-72	Chem. Eng.	4(4)	6
25-08	Psychology	6	3	4-61	Chem. E. Therm.	3	3	4-62	Chem. E. Therm.	4	4
	or			11-73	Anal. Chem.	2(3)	3	4-42	Prop. of Mat.	2	2
23-06	Rec. Eur. Hist.	6	3		Lib. Elect.	3	3		Lib. Elect.	3	3
		<u>17(3) 9</u>				<u>15(7)18</u>				<u>16(4)18</u>	

FIFTH YEAR

Term 13 ^a				Term 14				Term 15			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
4-80	Proc. Eng. Ec.	6	3	3-04	Elect. Eng.	3(3)	4	3-05	Elect. Eng.	3	3
30-16	Literature	6	3	4-62	Ch. E. Kinet.	4	4	4-46	Int. Nucl. Eng.	4	4
	Lib. Elect.	6	3	4-43	Eng. Mat.	3	3	4-82	Plant Des. Ec.	3	3
				4-91	Process Des.	1(6)	6	4-92	Process Des.	0(6)	5
					or				or		
				4-93	Projects	1(6)	6	4-94	Projects	0(6)	5
				50-01	Prof. Dev.	3	1	4-44	Ind. Processes	3	3
		<u>18 -- 9</u>				<u>14(9)18</u>				<u>13(6)18</u>	

^a Summer term - 5 weeks. () indicate laboratory hours.

Curriculum in Industrial Engineering

FIRST YEAR

Term 1				Term 2				Term 3			
No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.	No.	Course	Cl.	Cr.
11-01	Gen. Chem.	3(3)	4	11-02	Gen. Chem.	3(3)	4	11-03	Gen. Chem.	3(3)	4
12-51	Eng. Graphics I	3(3)	3	12-52	Eng. Graphics II	3(3)	3	12-53	Eng. Graphics III	3(3)	3
14-51	Math. I	5	4	14-52	Math. II	5	4	14-53	Math. III	5	5
15-51	Physics	3	3	15-52	Physics	3	3	15-53	Physics	3	3
30-01	English	3	3	30-02	English	3	3	30-03	English	3	3
16-10	Phys. Ed.			16-11	Phys. Ed.			16-12	Phys. Ed.		
or				or				or			
61-01	ROTC (Basic)	<u>17(6)17</u>		61-02	ROTC (Basic)	<u>17(6)17</u>		61-03	ROTC (Basic)	<u>17(6)18</u>	

SECOND YEAR

Term 4 ^a				Term 5				Term 6			
11-04	Gen. Chem.	3(3)	2	3-01	Elect. Eng.	3	3	2-20	App. Mech.	4	4
12-54	Eng. Graphics IV	3(3)	2	14-05	Diff. Calc.	4	4	3-02	Elect. Eng.	3	3
14-54	Math. IV	5	2-1/2	15-55	Physics	4(3)	5	14-06	Int. Calc.	4	4
15-54	Physics	5	2-1/2	22-04	Mod. Dem.	3	3	15-56	Physics	3(3)	4
				30-15	Literature	3	3	22-05	Mod. Dem.	3	3
<u>16(6)9</u>				<u>17(3)18</u>				<u>17(3)18</u>			

THIRD YEAR

Term 7 ^a				Term 8				Term 9			
2-21	App. Mech.	6	3	2-22	Str. of Mat.	4	4	1-20	Hydraulics	3	3
30-16	Literature	6	3	2-81	Heat Eng.	4	4	2-23	Str. of Mat.	3	3
25-07	Psychology	6	3	5-10	Ind. Mgt.	3	3	2-82	Heat Eng.	3	3
	or			14-07	Diff. Eq.	4	4	3-03	Elect. Eng.	3	3
23-05	Rec. Am. Hist.	6	3	20-11	Economics	3	3	5-11	Ind. Mgt.	3	3
								20-12	Economics	3	3
<u>18 9</u>				<u>18 18</u>				<u>18 18</u>			

FOURTH YEAR

Term 10 ^a				Term 11				Term 12			
5-22	Proc. Plan. & Tool Design	5(5)	3	1-21	Hydraulics	3	3	2-13	Mechanism	3	3
20-22	Ind. Stat. I	4(4)	3	2-43	Mat. and Proc.	3	3	5-13	Meth. Time An.	3(3)	4
25-08	Psychology	6	3	5-09	Ind. Stat. II	4	3	5-18	Qual. Control	3(2)	3
	or			5-12	Meth. Time An.	3(3)	4	41-35	Ind. Acct.	5	5
23-06	Rec. Eur. Hist.	6	3	41-34	Ind. Acct.	3	3		Lib. Elect.	3	3
					Lib. Elect.	3	3				
<u>15(9)9</u>				<u>19(3)19</u>				<u>17(5)18</u>			

FIFTH YEAR

Term 13 ^a				Term 14				Term 15			
14-30	Finite Math.	5	3	2-44	Phys. Met.	3(3)	4	5-23	Plant Layout		
46-03	Contracts & Agency	6	3	5-19	Pers. Admin. I	3	3		& Mat. Hdlg.	3(6)	5
	Lib. Elect.	6	3	5-20	Pers. Admin. II	3	3	5-25	Eng. Ec.	4	4
				5-24	Ind. Eng. Lab.	0(4)	3	5-26	Seminar	2	2
				5-27	Operations Research	4	4	5-28	Oper. Res. Prob.	3	3
				50-01	Prof. Devel.	3	1	29-03	Eff. Speaking	3	3
<u>17 9</u>				<u>16(7)18</u>				<u>15(6)17</u>			

^aSummer term - 5 weeks. () indicate laboratory hours.

COURSES OF INSTRUCTION

On the pages which follow are given in numerical order the synopses of courses offered in the several curricula of the Basic Colleges. Although not all courses are offered every year, all will be offered during the normal period of each student's curriculum. The term "preparation" indicates a course that must be taken before undertaking the advanced course to which it applies.

Courses in the part-time evening programs in the College of Engineering are identical with those in the full-time day program. For administrative purposes, part-time evening courses in engineering will carry a zero before the course number. (Ex. 03-01 Electrical Engineering). Course descriptions for evening offerings of the College of Liberal Arts are given in the separate Evening Sessions Bulletin of the College.

A credit hour equals approximately three clock hours of work: ordinarily one hour of class and two hours of preparation a week for a term of 10 weeks. Laboratory and drawing courses normally require fewer hours of outside preparation and, therefore, carry less credit than lecture courses. Since the summer terms are only 5 weeks long, courses offered in the summer carry one-half of the credits carried by courses which meet the same number of hours per week in the regular 10-week terms. Credit hours can be converted into standard semester hours by multiplying by 10/16, the ratio of the number of weeks in the term to the usual number of weeks in the semester.

The University reserves the right to withdraw, modify, or add to the courses offered or to change the order or content of courses in any curriculum.

Civil Engineering

1-10 Surveying

Basic surveying principles are taught in the lecture portion and applied in the field work portion of this course. Prep. 14-53, 3 Class Hrs.; 3 Lab. Hrs.; 3 Credit Hrs.

1-11 Surveying

Simple, compound, and reverse horizontal curves, and spiral easement curves, vertical curves, and earthwork solutions.

In the drafting room, data collected in the field portion of Course 1-10 are calculated, plotted, and traced as a finished plan. Prep. 1-10; 4 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

1-12 Surveying

Spherical trigonometry; observations on the sun for latitude, time, and azimuth; and basic principles of photogrammetry and geodesy. Preparation of maps from collected data. Prep. 1-11; 3 Class Hrs.; 3 Lab. Hrs.; 3 Credit Hrs.

1-13 Surveying

Theory and use of the plane table, precise leveling, precise taping, and use of the Ephemeris tables. Cross sections; earthworks calculations; mass diagram solution; plane table problems; observations on the sun for latitude, time, and azimuth; observation on Polaris for azimuth; and basic problems of photogrammetry. Prep. 1-12; 2 Class Hrs.; 12 Lab. Hrs.; 3 Credit Hrs.

1-20 Hydraulics

A basic course in hydraulics dealing with the laws of hydrostatics and hydrokinetics.

Topics studied include: gauges; manometers; pressure intensities; simple dams; flotation problems; Bernoulli's theorem; the Venturi meter, orifices; short tubes; pipe lines; and open channel flow. Prep. 2-21; 3 Class Hrs.; 3 Credit Hrs.

1-21 Hydraulics

Equivalent pipes; the Hardy Cross method of analysis; weirs; dimensional analysis; model analysis by Froude's number and by Reynold's number; flow of fluids through closed conduits; the hydraulic jump; and the drawdown and backwater curves. Prep. 1-20; 3 Class Hrs.; 3 Credit Hrs.

1-24 Sanitary Engineering

A general course in water supply engineering including: forecasting population; quality and quantity of water; rainfall; runoff; collection and storage of ground water and surface water; sand filters; treatment of waters for the removal of impurities; disinfection of waters; and the distribution system. Prep. 1-21; 4 Class Hrs.; 4 Credit Hrs.

1-25 Sanitary Engineering

A companion course to 1-24. Collection and disposal of sewage and storm water; sewerage systems; collection of design data; modern methods of sewage treatment and operation of treatment plants.

Laboratory portion considers handling and analysis of water and sewage. Prep. 1-24; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

1-26 Fluid Mechanics

Application of fundamental principles of mechanics to the flow of fluids. The student's prior experience with partial differential equations and vector analysis will be used as a basis for this treatment. Prep. 2-21, 3-19; 3 Class Hrs.; 3 Credit Hrs.

1-30 Transportation

Traffic engineering, administration, surveys, and plans of modern highways, economics of highway construction, soil tests and classifications, manufacture and testing of bituminous products, methods of soil stabilization. Prep. 1-12; 3 Class Hrs.; 3 Credit Hrs.

1-31 Transportation

Design and construction of the higher cost types of roadways.

Application of latest research developments is considered throughout all phases of this course and 1-30. Prep. 1-30; 2 Class Hrs.; 2 Credit Hrs.

1-40 Structural Analysis

Determination of reactions, shears, bending moments, and stresses developed by loads upon beams and frame structures. Prep. 2-22; 3 Class Hrs.; 3 Credit Hrs.

1-41 Structural Analysis

Roof loads; girder, simple truss, and subdivided truss, highway and railway bridges; influence lines and their function in determining the shears, bending moments, and stresses produced by moving load systems; discussion of design stresses. Prep. 1-40; 4 Class Hrs.; 4 Credit Hrs.

1-42 Structural Analysis

Slope and deflection of beams and girders due to bending, deflection of statically determinate framed structures. Prep. 1-41; 3 Class Hrs.; 3 Credit Hrs.

1-43 Structural Analysis

Analysis of continuous beams, simple statically indeterminate trusses and frameworks; shears, moments, and stresses developed in tall building frames. Prep. 1-42; 4 Class Hrs.; 4 Credit Hrs.

1-48 Structures

Analysis and design of simple structures with emphasis on structures of special interest to mechanical engineers including: Steel mill building frames, trusses, building and crane girders, and columns. Prep. 2-23; 3 Class Hrs.; 3 Credit Hrs.

1-49 Concrete Testing Laboratory

Testing (ASTM and AASHTO Standards) of Portland Cement concrete and aggregates used in making concrete.

Complete reports are required at the conclusion of all tests. Prep. 2-23; 1 Class Hr.; 4 Lab. Hrs.; 3 Credit Hrs.

1-50 Concrete

Fundamental principles involved in the theory of reinforced concrete behavior; analysis and design of elementary members; shear, bond, and anchorage; discussion of specifications and current practice. Prep. 2-23, 1-49; 3 Class Hrs.; 3 Credit Hrs.

1-51 Concrete

Diagonal tension; design of vertical and inclined stirrups; analysis and design of axially loaded columns; shrinkage and plastic flow; combined bending and axial effects; continuous reinforced concrete structures; interpretation of the "ACI Building Code Requirements for Reinforced Concrete." Prep. 1-50; 4 Class Hrs.; 4 Credit Hrs.

1-54 Design of Structures

Lectures and problem work in designing connections for various structural elements using rivets and welding; connections with concentric and eccentric loadings. Prep. 2-23; 2 Class Hrs.; 4 Lab. Hrs.; 2 Credit Hrs.

1-55 Design of Structures

Design of moment connections for fixed ended beams; design of individual members in a structural framework. Shop drawings are made for the members as designed. Prep. 1-54; 3 Class Hrs.; 6 Lab. Hrs.; 3 Credit Hrs.

1-56 Design of Structures

Complete design and drawing of a plate girder for a building or bridge; design of reinforced concrete beams and footings; design of continuous beams, both steel and concrete. Prep. 1-55; 9 Lab. Hrs.; 3 Credit Hrs.

1-57 Foundation Engineering

Piles; pile driving equipment, pile loading capacity, marine borers, caissons, cofferdams, methods of underpinning, and ground water control in foundation construction; dredging. 2 Class Hrs.; 2 Credit Hrs.

1-58 Engineering Geology

Minerals in the earth's surface, classification, and geologic structure of rocks; weathering, subsurface water, landslides, river and river action, shore lines and beaches, dams and reservoirs, geological maps. 3 Class Hrs.; 3 Credit Hrs.

1-60 Construction Costs

Organization of the construction industry; estimates of construction cost methods, both direct and indirect; types of construction agreements; bidding procedure; cost keeping, reports, debt retirement, and depreciation. 3 Class Hrs.; 3 Credit Hrs.

Mechanical Engineering

2-13 Mechanism

Mathematical and graphical solutions of problems of linear and angular velocities, vector analysis, linkages, cams, rolling contact, gears, gear tooth design, epicyclic trains, belt rope and chain drives, and miscellaneous motions. Prep. 2-21; 3 Class Hrs.; 3 Credit Hrs.

2-14 Machine Design

Application of theoretical principles with practical details in design work, such as keys, pins, cotter, press and shrink fits, weldments, chains, and brakes. Prep. 2-24, 2-43; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

2-15 Machine Design

Application of theoretical mechanics and materials to problems of lubrication, springs, shafting, couplings, crankshafts, flywheels, gearing, and dynamic loading. Prep. 2-14; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

2-20 Applied Mechanics (Statics)

Force systems in two and three dimensions; friction; first and second moments; transfer of axes, rotation of axes, and principal axes. Prep. 14-05, 15-02; 4 Class Hrs.; 4 Credit Hrs.

2-21 Applied Mechanics (Kinetics)

Kinetics and dynamics of bodies in translation, pure rotation, and general plane motion under conditions of uniform or variable acceleration, including discussion of center of percussion; work and energy; linear and angular momentum; impulse and impact. Prep. 2-20, 14-06; 6 Class Hrs.; 3 Credit Hrs.

2-22 Strength of Materials

Physical properties of materials; the stress-strain diagram, axially loaded members; resilience; indeterminate axially loaded members; stresses in thin cylinders and spheres; riveted and welded connectors; torsion in circular members; shear and bending moments in beams; bending stresses in beams and beam design. Prep. 2-21; 4 Class Hrs.; 4 Credit Hrs.

2-23 Strength of Materials

Elastic curve for determinate and indeterminate beams; Theorem of Three Moments; combined bending and axial loads; column action; and elastic energy theory. Prep. 2-22, 3 Class Hrs.; 3 Credit Hrs.

2-24 Advanced Mechanics

Stress at a point and theories of failure applied to thick hollow cylinders, curved beams and similar topics. Prep. 2-23; 3 Class Hrs.; 3 Credit Hrs.

2-26 Engine Dynamics

Momentum principles and the application to gyroscopes; Coriolis' law; balancing of rotating parts; detailed treatment of vibrations. Prep. 2-21, 14-20; 3 Class Hrs.; 3 Credit Hrs.

2-27 Fluid Mechanics

Flow through weirs; dimensional analysis; model analysis; flow of fluids through closed conduits; impulse and momentum as applied to fluid flow; applications to pumps and hydraulic turbines. Prep. 1-20; 3 Class Hrs.; 3 Credit Hrs.

2-28 Fluid Mechanics

Dimensional analysis and linear momentum; two-dimensional flow of an ideal fluid; the Kutta-Joukowski lift theorem; three-dimensional flow, including the Prandtl vortex theory, von Karman vortex sheet, and elementary boundary layer theory. Prep. 1-22 (or 2-27), 14-20; 3 Class Hrs.; 3 Credit Hrs.

2-29 Experimental Stress Analysis

Theory and application of various methods of stress analysis; theory and experimental procedures involved in use of photoelasticity, photostress, the electric resistance strain gage and brittle coatings as applied to stress analysis

problems; experiments illustrating the analysis procedure. Prep. 2-24; 4 Class Hrs.; 4 Credit Hrs.

2-43 Materials and Production Processes

Physical properties, composition, and methods of production of ferrous and non-ferrous metals and their alloys; plastics; timber; lime, cement, and concrete; selection of materials for specific service; techniques, processes, and machines used in manufacturing; modern foundry practice. Prep. 11-04; 3 Class Hrs.; 3 Credit Hrs.

2-44 Physical Metallurgy

Relation between crystalline structures and physical properties of metals; theory of crystallization; equilibrium diagrams of the ferrous and non-ferrous metals; polishing and etching of metallic specimens for examination by microscope and metallograph; heat treatment methods for common metals and their effects on crystalline structure. Prep. 2-43; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

2-46 Metal Processing

Methods of processing metals in industry; small tool characteristics; machine tools; metal working costs; most effective methods for the removal of metal; the heat treatment of tools; the use of jigs and fixtures. Prep. 2-43; 4 Class Hrs.; 6 Lab. Hrs.; 3 Credit Hrs.

2-60 Mechanical Engineering Laboratory

Methods available for measurement of standard characteristics, such as pressure, speed, temperature, flow rates, heats of combustion, thickness, and other linear dimensions, friction factors, heat transfer coefficients; gage calibration, valve and controls setting, and strain gaging. Prep. 1-20, 2-23, 2-82, 2-83; 3 Lab. Hrs.; 2 Credit Hrs.

2-61 Mechanical Engineering Laboratory

Tests on power plant equipment in accordance with accepted standards, such as the ASME Power Test Codes or the ASTM Standards; writing of adequate engineering reports. Tests on typical steam engines, pumping machinery, air compressors and blowers, and gasoline engines. Prep. 2-60, 2-84; 3 Lab. Hrs.; 2 Credit Hrs.

2-62 Mechanical Engineering Laboratory

Tests on typical air-conditioning units; refrigeration machines of the vapor compression type; Diesel engines; material tests of tension, torsion, and impact resistance of metals; and fluid mechanics. Prep. 2-24, 2-28, 2-60, 2-84, 2-85; 4 Lab. Hrs.; 3 Credit Hrs.

2-63 Mechanical Engineering Laboratory

Tests on transverse bending of steel beam; compression of metal and timber; lubricating oils; CFR test engine; vibrations; and fluid mechanics. Prep. 2-26, 2-62; 4 Lab. Hrs.; 3 Credit Hrs.

2-64 Testing Materials Laboratory

Standard methods of inspecting and testing metals and woods of importance in structural engineering; tests to determine tensile properties, hardness, transverse strength, torsional resistance, column action, impact resistance, and bending properties; research methods applied to specific questions. Prep. 2-23, 2-43; 1 Class Hr.; 4 Lab. Hrs.; 3 Credit Hrs.

2-80 Heat Engineering

Introduction to the principles of thermodynamics, including the first and second laws, perfect gases, vapor tables, and simple thermodynamic processes; equipment used in modern power plants. Prep. 14-06, 15-06; 4 Class Hrs.; 4 Credit Hrs.

2-81 Heat Engineering - Thermodynamics

Fundamentals of thermodynamics: general theory of heat and matter, laws of thermodynamics, availability of energy, entropy, equations of state of fluids, laws of perfect gases, specific heats, properties of liquids and vapors; development and use of vapor tables and charts, thermodynamic processes of materials; general equations of thermodynamics. Prep. 14-06, 15-06; 4 Class Hrs.; 4 Credit Hrs.

2-82 Heat Engineering

Principles of thermodynamics applied to the various phases of heat engineering; theory of vapor engines; analysis of the types of actual engines used with their controlling devices and their operating characteristics, efficiencies, and capacity measures. Steam boilers, feed water heaters, and other power plant auxiliaries are considered from the equipment and performance viewpoints; theory of gas and vapor flow through orifices and nozzles. Prep. 2-81; 3 Class Hrs.; 3 Credit Hrs.

2-83 Heat Engineering - Heat Transfer and Air Conditioning

Principles of heat transfer; mean temperature differences, composite walls, conductivities, over-all heat transfer coefficients, convection, radiation. Principles of heating, ventilation, and air conditioning of buildings; warm-air, steam, and hot-water systems; heating boilers; stokers and burners, combustion, and automatic controls. Prep. 2-81; 6 Class Hrs.; 3 Credit Hrs.

2-84 Heat Engineering - Refrigeration and Compressors

Vapor compression system of refrigeration; evaporator and condenser design; low-temperature refrigeration cycles; multiple evaporator and compressor combinations; dual compression; absorption refrigeration and controls. Principles of gas compression and the application to the air compressor and to the air refrigeration cycle. Prep. 2-82; 4 Class Hrs.; 4 Credit Hrs.

2-85 Heat Engineering - Internal Combustion Engines

Internal combustion engines; analysis of gasoline and Diesel engine construction, cycles, combustion theory, air-fuel mixtures, carburetion, detonation, valve timing, and fuels; effect of these items on power output, efficiency, and design. Prep. 2-82; 4 Class Hrs.; 4 Credit Hrs.

2-86 Heat Engineering - Turbines

Steam turbines, dynamic action of jets on moving blades, velocity diagrams; calculations of turbine efficiencies; turbine losses; lubrication; governing mechanisms; design of a turbine; principles, performance, and constructional details of gas turbines. Prep. 2-82; 3 Class Hrs.; 3 Credit Hrs.

2-87 Power Plant Engineering

Topics and problems taken from engineering practice are discussed; principles and methods of analyzing power plant problems, efficiencies, and costs of operation of different types of plants to determine type best suited for conditions and location involved. Prep. 2-85, 2-86; 4 Class Hrs.; 4 Credit Hrs.

2-89 Nuclear Engineering

Broad survey of various areas of nuclear technology. Studies of types of reactors, elementary reactor design, waste disposal, health physics, radio-active tracer techniques, etc. Prep. 15-41; 4 Class Hrs.; 4 Credit Hrs.

Electrical Engineering

3-01 Electrical Engineering

Basic principles of d-c and a-c circuits for the non-electrical engineering student. D-c circuit theory, complex notation, real and reactive power, power factor, resonance phenomena, and three-phase circuits. Prep. 15-03, 15-04; 3 Class Hrs.; 3 Credit Hrs.

3-02 Electrical Engineering

Magnetic circuits, transformers, polyphase induction motors, synchronous machines, d-c machines, small motors, and special machines. Discussion of applications of these devices in industry. Prep. 3-01; 3 Class Hrs.; 3 Credit Hrs.

3-03 Electrical Engineering

Application of electron tubes, motors, and related devices to industrial control problems. Prep. 3-02; 3 Class Hrs.; 3 Credit Hrs.

3-04 Electrical Engineering

For the chemical engineering student in the application of electrical engineering to industrial processes. Basic d-c and a-c circuit theory; elementary theory of electron tubes; characteristics and associated circuits of high-vacuum diode and triode, thyatron, and phototube. Laboratory exercises accompany the lecture course. Prep. 15-03, 15-04; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

3-05 Electrical Engineering

Application to industrial processes of those devices studied in 3-04. Operating characteristics of d-c motors and generators, a-c motors, transformers; control and regulation of motor speed and generator voltage; basic theory of feedback. Laboratory demonstration periods accompany the lectures. Prep. 3-04; 3 Class Hrs.; 3 Credit Hrs.

3-15 Polyphase A-C Circuits

Voltage, current, and power relations in polyphase circuits; balanced and unbalanced conditions; methods of measuring three-phase power, application of symmetrical phase components to the solution of unbalanced polyphase circuits. Prep. 3-53; 3 Class Hrs.; 3 Credit Hrs.

3-19 Field Theory I

Working knowledge of electromagnetic theory; electrostatics, magnetostatics, vector analysis, and Maxwell's equations; vector analysis in the solutions of practical problems. Prep. 14-20; 3 Class Hrs.; 3 Credit Hrs.

3-28 Transmission Lines

Fundamental principles and applications of transmission lines, throughout the entire range of frequencies, to the point where circuit theory must be replaced by field theory.

The traveling wave phenomenon; steady state solutions; concepts of characteristic impedance and propagation function; standing waves and their elimination. Charts are used to solve problems of lossy and lossless lines. Radio-frequency, telephone and telegraph, and power-transmission lines. Prep. 3-29; 4 Class Hrs.; 4 Credit Hrs.

3-29 Field Theory II

A continuation of 3-19. Maxwell's equations applied to wave propagation, reflection, radiation, wave guides, and antennas. Prep. 3-19; 3 Class Hrs.; 3 Credit Hrs.

3-32 Networks and Filters

A continuation of 3-28. Review of network analysis and characteristics of passive four-terminal networks; ladder filters; introduction of modern network synthesis. Prep. 3-28; 3 Class Hrs.; 3 Credit Hrs.

3-39 Field Theory III

A continuation of 3-29. Further applications to waveguides, antennas, and cavities. Magnetohydrodynamics as it pertains to engineering applications. Prep. 3-29; 3 Class Hrs.; 3 Credit Hrs.

3-51 Electrical Engineering I

Introductory course to electric-circuit theory covering Kirchhoff's laws, networks, solutions by the loop and nodal methods; solution of linear simultaneous equations as applied to resistance methods; Thévenin's, Norton's, and reciprocity theorems. Discussion of typical networks. Prep. 15-03, 15-04; 3 Class Hrs.; 3 Credit Hrs.

3-52 Electrical Engineering II

Transient phenomena of the first and second order for various combinations of resistance, inductance, and capacitance. Singularity functions and impulse response. Complex representation of sinusoids. Prep. 3-51; 3 Class Hrs.; 3 Credit Hrs.

3-53 Electrical Engineering III

Behavior of circuits when excited in the sinusoidal steady state. Impedance as viewed in the frequency domain, resonance, magnitude and frequency scaling, vector diagrams, and mutual inductance. Energy and power, both active and reactive. Prep. 3-52; 6 Class Hrs.; 3 Credit Hrs.

3-54 Electrical Engineering IV

Principles of magnetic circuits with d-c and/or a-c excitation. Permanent magnets. Air-core transformers and magnetic coupling. Single-phase power-transformer theory and application. Audio transformers. Prep. 3-53; 4 Class Hrs.; 3 Credit Hrs.

3-55 Electrical Machinery I

Introduction to a unified theory of electrical machinery wherein the rotating machine is regarded as a general electromechanical energy-conversion device. D-c machines; analysis of their performance, control and application aspects. Prep. 3-54, 3-15; 3 Class Hrs.; 3 Credit Hrs.

3-56 Electrical Machinery II

Construction, general theory, and operating characteristics of synchronous generators and synchronous motors, and their applications. Prep. 3-55; 3 Class Hrs.; 3 Credit Hrs.

3-57 Electrical Machinery III

3-55 and 3-56 extended to polyphase induction motors, fractional-horsepower a-c motors, and special purpose machines. Prep. 3-56; 3 Class Hrs.; 3 Credit Hrs.

3-60 Servomechanisms

Analysis and design of simple servomechanisms through the use of the Laplace transform. System adjustments, compensation methods, and optimum design techniques. Typical automatic-control devices. Prep. 3-80; 3 Class Hrs.; 3 Credit Hrs.

3-70 Electronics I

Electron tubes and transistors. Motion of electrons in electric and magnetic fields, elements of solid-state physics, static and dynamic characteristic curves for vacuum tubes and transistors, graphical location of operating points, and incremental-parameter equivalent circuits. Prep. 3-53; 3 Class Hrs.; 3 Credit Hrs.

3-71 Electronics II

Design, calculation, and operation of basic vacuum-tube and transistor circuits. Grounded-cathode, grounded-plate, and grounded-grid vacuum-tube circuits, grounded-emitter, grounded-collector, and grounded-base transistor circuits. Direct-coupled, R-C coupled, and transformer-coupled stages. Equivalent circuits and graphical methods of solution. Prep. 3-70; 3 Class Hrs.; 3 Credit Hrs.

3-72 Electronics III

Video amplifiers, r-f tuned amplifiers, and feedback amplifiers. Compensation of vacuum-tube and transistor amplifiers for shunt capacitance, coupling capacitance, and temperature effects. Vacuum-tube and transistor tuned amplifiers (both narrow band and stagger tuned). Feedback amplifiers; Bode's general formulas. Limitations and ultimate capabilities of electronic circuits. Prep. 3-71; 3 Class Hrs.; 3 Credit Hrs.

3-73 Electronics IV

Vacuum-tube and other types of oscillators; criterion for oscillation, and frequency stabilization. Broadcast receivers; theory of amplitude and frequency modulation, and detection. Prep. 3-72; 3 Class Hrs.; 3 Credit Hrs.

3-74 Electronics V

Pulse circuits commonly used in television, radar, pulse-modulated communication systems, and digital computers. Prep. 3-73; 3 Class Hrs.; 3 Credit Hrs.

3-80 Transients in Electric Circuits

Theory of the Laplace transform, and the principles applied in the solution of lumped-parameter electric-circuit problems. Partial-fraction expansions, solutions to higher-order algebraic equations, singularity functions, and convolution methods. Prep. 3-53, 14-20; 6 Class Hrs.; 3 Credit Hrs.

3-90 Electrical Engineering Laboratory I

Experiments on series and parallel a-c circuits, instrument calibration, resistance measurements, network theorems, and transformer testing. Prep. 3-54; 6 Lab. Hrs.; 3 Credit Hrs.

3-91 and 3-92 Electrical Engineering Laboratories II and III

Experiments in the general areas of electrical measurements and basic electronic circuits. Prep. 3-70; 3 Lab. Hrs.; 3 Credit Hrs. per term.

3-93 Electrical Engineering Laboratory IV

Experiments in three-phase circuits, magnetic devices, and control engineering. Prep. 3-15, 3-54; 3 Lab. Hrs.; 3 Credit Hrs.

3-94 Electrical Engineering Laboratory V

Experiments in the fields of power and communications. Basic principles of operation of energy-conversion devices. Microwave circuits and devices, pulse circuits, frequency modulation, analog and digital computers, etc. Prep. 3-55, 3-29, 3-72; 12 Lab. Hrs.; 6 Credit Hrs.

3-95 Electrical Engineering Laboratory VI

Application of electronic control and regulatory circuits (including servomechanisms). Pulse-forming and delay lines, and slotted lines for u-h-f impedance measurements. Prep. 3-29, 3-55; 3 Lab. Hrs.; 4 Credit Hrs.

3-96 Electrical Engineering Laboratory VII

Experiments on synchronous generators and motors, and induction motors. Prep. 3-56; 3 Lab. Hrs.; 3 Credit Hrs.

Chemical Engineering

4-42 Properties of Materials

Modern theories of solid state physics, emphasizing the molecular concepts on which the physical properties of engineering materials depend. Prep. 11-65, 15-41; 2 Class Hrs.; 2 Credit Hrs.

4-43 Engineering Materials

Materials encountered in the chemical engineering profession. Effect of composition, heat treatment, and mechanical work upon the physical properties of metals and their alloys. Prep. 11-04, 15-41, 4-42; 3 Class Hrs.; 3 Credit Hrs.

4-44 Industrial Processes

Major chemical-process industries studied with emphasis on kinetic and thermodynamic principles in design and operation of the plant. Comprehensive problems. Prep. 4-62, 4-63; 3 Class Hrs.; 3 Credit Hrs.

4-46 Introduction to Nuclear Engineering

Review of nuclear physics. Nuclear fission, the nuclear chain reactor, reactor theory, radiation shielding, materials of construction, reactor instrumentation and control, separation of stable isotopes, chemical separations and processing, and special techniques of nuclear engineering. Prep. 15-41; 14-06; 4 Class Hrs.; 4 Credit Hrs.

4-50 Introduction to Chemical Engineering

Fundamental concepts of the chemical engineering profession. Humanistic as well as the scientific side of the profession. Mathematical tools and stoichiometric relations. Prep. 11-02, 15-02; 4 Class Hrs.; 2 Credit Hrs.

4-51 Chemical Engineering Literature

Sources of information available to chemical engineers. Series of literature search problems. Prep. 4-50; 1 Class Hr.; 1 Credit Hr.

4-52 Chemical Engineering Calculations

Chemical engineering fundamentals, including material balance, energy balance, static equilibria, dynamic equilibria, and economic balance. Essentially a problem course. Prep. 4-50; 4 Class Hrs.; 4 Credit Hrs.

4-60 Fluid Mechanics

Fundamental principles of fluid mechanics. Methods of determining rates of flow and power consumption of fluids flowing through pipe lines. Flow of gases and oils. Laboratory work. Prep. 15-02, 4-50; 5 Class Hrs.; 3 Lab. Hrs; 3 Credit Hrs.

4-61 Chemical Engineering Thermodynamics

First law developed for batch and flow systems. Heat effects in physical and chemical processes. Equations relating the thermodynamic functions of fluids to variables of state. Second law, and preparation of tables and charts of thermodynamic properties from equations. Prep. 4-52, 14-07; 3 Class Hrs.; 3 Credit Hrs.

4-62 Chemical Engineering Thermodynamics

Charts and tables of thermodynamic properties of substances used to analyze and solve process problems. Physical and chemical equilibria. Applications of first and second laws, compression and expansion of fluids. Prep. 4-61; 4 Class Hrs.; 4 Credit Hrs.

4-63 Chemical Engineering Kinetics

Distinctions between rates and equilibria, units of reaction rates, the reaction velocity constant, and methods of determining reaction orders. Principles of reactor design applied to homogeneous batch and flow reactions. Catalysis theory, transfer of heat and mass in catalytic beds, catalytic reactor design, and uncatalyzed heterogeneous reactions. Prep. 4-62; 4 Class Hrs.; 4 Credit Hrs.

4-70 Heat Transfer

Basic concepts of heat transfer by conduction, convection, and radiation. Resistance to heat transfer of fluid films. Laboratory experiments. Prep. 4-60, 4-52; 5 Class Hrs.; 3 Lab. Hrs.; 3 Credit Hrs.

4-71 Chemical Engineering

Application of chemical engineering fundamentals to mechanical separations, evaporation, air conditioning, and drying. Laboratory experiments. Students take an active part in planning the mode of operation of the equipment and the data to be taken. Report writing. Prep. 4-60, 4-52, 4-70; 4 Class Hrs.; 4 Lab. Hrs.; 6 Credit Hrs.

4-72 Chemical Engineering

Mass transfer techniques stressing the physical mechanisms involved in the transfer of material between homogeneous phases. Absorption, distillation, and extraction. Laboratory work. Prep. 4-71; 4 Class Hrs.; 4 Lab. Hrs.; 6 Credit Hrs.

4-80 Process Engineering Economics

Fundamentals of economics and statistics applied to research, raw materials, markets, labor, power, water, transportation, labor relations, and similar economic factors as related to the process industries. Laws relating to waste disposal, atmospheric and stream pollution, and patents. Prep. 4-51, 20-12; 6 Class Hrs.; 3 Credit Hrs.

4-82 Plant Design Economics

Capital required and operating costs for a plant to produce a specified annual

tonnage of one or more chemical materials. Equipment necessary to carry out the processes selected and buildings required to house the plant determined. Sources of cost data available without inquiry to manufacturers are searched out and drawn upon fully in making the estimates. Report of evaluation of the venture based upon these data and sound economic principles. Prep. 4-51, 4-80; 3 Class Hrs.; 3 Credit Hrs.

4-91 Process Design

Process design engineering using fundamentals of engineering science and economics studied in previous courses. Preparation of process flow sheets, complete material and energy balances, selection of equipment, and design of small chemical-processing units. Prep. 4-71, 4-72; 1 Class Hr.; 6 Lab. Hrs.; 6 Credit Hrs.

4-92 Process Design

Process design of a complete chemical plant and the evaluation of the economic factors involved. Prep. 4-91; 6 Lab. Hrs.; 5 Credit Hrs.

4-93 Projects

Individual research related to some phase of chemical engineering. Open only to students selected by the department head on the basis of scholarship and proved ability. Research topic selected by mutual agreement of the student and his supervising professor. Prep. 4-71, 4-72; 1 Class Hr.; 6 Lab. Hrs.; 6 Credit Hrs.

4-94 Projects

A continuation of the research work undertaken in 4-93. Prep. 4-93; 6 Lab. Hrs.; 5 Credit Hrs.

Industrial Engineering

5-03 Industrial Management

For electrical engineering majors. General problems of competitive industry and modern scientific management principles and methods. Industrial systems and social effects of mechanization; legislation, labor unions, education. Organization and financing modern industry. 3 Class Hrs.; 3 Credit Hrs.

5-09 Industrial Statistics II

A continuation of 20-22. Drawing of inferences from samples, simple linear correlation and fundamentals of statistical quality control. Prep. 20-22; 4 Class Hrs.; 3 Credit Hrs.

5-10 Industrial Management

Administrative and managerial aspects of plant operation. Background and evolution of modern industrial management; ownership of industry; plant location and buildings; factory layout and equipment; purchasing function; production planning and control. Problems facing management today. 3 Class Hrs.; 3 Credit Hrs.

5-11 Industrial Management

Inspection and quality control functions; motion and time study; classification systems; cost accounting; maintenance; wage and salary administration; industrial safety. Prep. 5-10; 3 Class Hrs.; 3 Credit Hrs.

5-12 Methods Time Analysis

Functions of the factory staff department commonly known as the Methods Department. Process analysis, process charts and flow diagrams; operation analysis, operation charts, man-and-machine charts, and micromotion study; principles of motion economy applied to all phases of factory operation, clerical and mechanical.

Laboratory application to a typical factory operation. Prep. 5-11; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

5-13 Methods Time Analysis

Time study techniques and procedures; use of timing devices; performance rating; application of allowances for unavoidable lost time and computation of a fair work standard. Technique of setting standards by means of predetermined time systems. Prep. 5-12; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

5-14 Methods Engineering

For students in Mechanical Engineering. Proper use of work simplification and time study. Process, operation, man-machine, and micromotion analysis.

Time study as a tool in management. Prep. 5-10; 1 Class Hr.; 2 Lab. Hrs.; 2 Credit Hrs.

5-17 Production Planning and Control

"Operating management" activity of planning and controlling the flow of materials through the shop; utilization of the equipment and manpower to best advantage.

Actual case problems are analyzed. Prep. 5-11; 3 Class Hrs.; 3 Credit Hrs.

5-18 Quality Control

Problems involved in setting up a Quality Control department within the factory. Fundamentals of statistical quality control, theory and application of various types of control charts, probability theory, sampling methods, and the statistics of reliability. Prep. 5-09; 3 Class Hrs.; 2 Lab. Hrs.; 3 Credit Hrs.

5-19 Personnel Administration I

Personnel function as an element of management. Humanistic side of personnel relations as opposed to the technical aspects. Development of a sound philosophy of employer-employee relations. 3 Class Hrs.; 3 Credit Hrs.

5-20 Personnel Administration II

Job evaluation techniques; problems of installing and maintaining job and position-evaluation systems and wage incentives in industrial enterprises. Prep. 5-11; 3 Class Hrs.; 3 Credit Hrs.

5-22 Process Planning and Tool Design

Principles and procedures of planning productive processes to manufacture articles at lowest cost consistent with volume; operation analysis; tool layout; design of jigs, fixtures, and other special tools; synthetic time standards in tool design. Prep. 2-43; 5-11; 5 Class Hrs.; 5 Lab. Hrs.; 3 Credit Hrs.

5-23 Plant Layout and Material Handling

Design of an industrial plant from geographical location through collection and analysis of necessary data to formulate processing, selection of equipment, and arrangement of production and service facilities for economy of manufacture. An actual plant layout is carried through. Prep. 5-11, 5-22; 3 Class Hrs.; 6 Lab. Hrs.; 5 Credit Hrs.

5-24 Industrial Engineering Laboratory

Digital computer programming with both engineering and business data processing applications. Laboratory time on I.B.M. 650 computer. Mechanical laboratory work in temperature control; pressure force and speed tests; bomb calorimetry; tensile testing. Prep. 2-23, 2-43, 2-82; 4 Lab. Hrs.; 3 Credit Hrs.

5-25 Engineering Economy

Economic analysis in formulating business policies, with emphasis on engineering aspects; criteria and technique of engineering economy as related to cost, economy of design, economy of selection, and application of engineering projects. Prep. 5-13, 5-18, 5-20; 4 Class Hrs.; 4 Credit Hrs.

5-26 Seminar

Summation and correlation of prior work with emphasis on relation to the over-all management problem and health of the enterprise; selected topics from current problems and literature in industrial engineering. Prep. senior standing in industrial engineering. 2 Class Hrs.; 2 Credit Hrs.

5-27 Operations Research

Recent developments in operations research as a management tool for making decisions. Extensive treatment of linear programming. Study of mathematical models for business problems. Design of experiments and analysis of variance. Prep. 5-09, 14-30; 4 Class Hrs. 4 Credit Hrs.

5-28 Operations Research Problems

Problem solving and case studies in areas of operations research. Prep. 5-27; 2 Class Hrs.; 2 Credit Hrs.

Biology

10-01 General Biology

Fundamental principles of the various fields of biology, beginning with the physical, chemical, and biological characteristics and behavior of protoplasm and cells; general plant and animal histology; irritability and conduction. 2 Class Hrs.; 3 Lab. Hrs.; 3 Credit Hrs.

10-02 General Biology

Plant and animal metabolism; maintenance of the internal environment; gametogenesis and cell division. Prep. 10-01; 2 Class Hrs.; 3 Lab. Hrs.; 3 Credit Hrs.

10-03 General Biology

Principles of genetics and eugenics; basic patterns of embryology; plant life histories. Prep. 10-02; 2 Class Hrs.; 3 Lab. Hrs.; 3 Credit Hrs.

10-04 General Biology

Life histories of animals; organic evolution; bioecology. Prep. 10-03; 3 Class Hrs.; 3 Lab. Hrs.; 2 Credit Hrs.

10-20 General Bacteriology

Biology of microorganisms, emphasizing the bacteria. Preparation of media, methods of sterilization, staining, isolation, and identification of pure cultures. Studies on biochemical activities and effects of physical agents. Prep. 10-04; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

10-21 General Bacteriology

Introduction to the bacteriology of water, sewage, air, and milk. Consideration of standards, plate counts, and physiological tests for water and milk; a bacterial analysis of air and the treatment and proper disposal of sewage. Prep. 10-20; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

10-30 Introduction to Medical Technology

An introduction to the methods, principles, and theories of medical technology. 3 Class Hrs.; 1-1/2 Credit Hrs.

10-31 Hematology

The normal and pathologic morphology of the blood and blood-forming organs with emphasis on the study of the blood from the viewpoint of diagnosis and prognosis. Prep. 10-30; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

10-32 Human Anatomy

The structure and functions of the human body. 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

10-33 Immunology

Resistance to infectious diseases, including the properties and behavior of antisera and antigenic substances. Prep. 10-31; 2 Class Hrs.; 3 Lab. Hrs.; 2-1/2 Credit Hrs.

10-40 Physiology

Properties of living protoplasm, the general organization and function of cells, translocation of materials and the organization of animals. The physiology of the skeletal systems of man and animals; the physiology of amoeboid, ciliary and contractile movement with emphasis on muscle metabolism. The

structure and function of neurons, reflex arcs, the autonomic nervous system and the sensory receptors. 3 Class Hrs.; 3 Lab. Hrs. 4 Credit Hrs.

10-41 Physiology

Fluid media of animals, emphasizing water and electrolyte balance and kidney function in many; the physiology of blood, including its formation, functions, clotting, antigens and tests for identifying blood. The physiology of the heart, nervous control of the vascular system, breathing and gas transport, heat regulation, nutrition, digestion and assimilation; a survey of the endocrine secretions and the physiologic aspects of reproduction. Prep. 10-40; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

10-55 Comparative Vertebrate Anatomy

Development and significance of the structural changes in the chordate groups; homology, analogy, metamerism, cephalization; general features of embryological development of the chordates, basic principles of phylogenesis, and the geological time scale provide a broad background for the interpretation of the significant morphological changes. Prep. 10-02; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

10-56 Comparative Vertebrate Anatomy

Ontogenetic and phylogenetic development of the digestive, circulatory, respiratory, excretory, reproductive, and nervous systems. Prep. 10-55; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

10-57 Invertebrate Zoology

Morphology, embryology, and histology of acoelomate animal phyla approached from the phylogenetic standpoint. Prep. 10-04; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

10-58 Invertebrate Zoology

Coelomate animal phyla. Prep. 10-57; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

10-59 Animal Histology

Normal microscopic anatomy of the tissues of the body, including cells, cell division, cytomorphosis, and cell differentiation. Characteristics of tissues and the morphology and function of epithelial, connective, and muscular tissues. Prep. 10-56; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

10-60 Animal Histology

Microscopic anatomy of nervous tissues with the histology of lymphatic, vascular, digestive, endocrine, reproductive, and sense organs. Prep. 10-59; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

10-61 Embryology

Descriptive embryogeny of *Amphioxus* and morphological development of

organ systems in the chick and pig. Principles of embryonic induction, polarity, blastulation and gastrulation; developmental and functional significance of the fetal membranes and circulation and embryology of digestive system. Prep. 10-56; 3 Class Hrs.; 3 Lab Hrs.; 4 Credit Hrs.

10-62 Embryology

Continued discussions of the embryology of the circulatory, urogenital, nervous, and other systems. Prep. 10-61; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

10-65 Genetics

Laws of inheritance as found in animals and plants, and their application to human relations, including the observational, experimental, cytological, statistical, and developmental approaches. Prep. senior standing; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

10-66 Genetics

The gene and its physiological aspects in relation to development and behavior. Population genetics and evolution. Prep. 10-65; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

10-69 Histological Technique

General methods of tissue preparation for purposes of microscopic study; preparation of solutions and stains; the microtome and its operation together with specific directions for fixation, clearing, hardening, embedding, section-cutting, and staining of tissues. Prep. 10-56; 1 Class Hr.; 6 Lab. Hrs.; 2 Credit Hrs.

10-70 Histological Technique

Practical application of the basic principles of tissue preparation and sectioning with exercises on the preparation of several tissues of the animal body portraying the qualities of selected stains and their combinations. Prep. 10-69; 1 Class Hr.; 6 Lab. Hrs.; 2 Credit Hrs.

10-78 Seminar

Discussion of the development, trends, and theoretical principles of medical technology. 1 Class Hr.; 1 Credit Hr.

10-79 Seminar

Continuation of 10-78. 1 Class Hr.; 1 Credit Hr.

10-80, 10-81 Senior Research

Experimental work in biology under the direction of staff members. Approval of department head necessary. Each course carries 2 to 4 hours' credit and extends through a single term.

Chemistry

11-01 General Chemistry

Fundamental ideas of matter and energy; states of matter; changes of state; symbols; equations; chemistry of hydrogen, oxygen, and water; early ideas of atoms and molecules; atomic structure. 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-02 General Chemistry

Chemical equilibrium; solutions; redox reactions; ionic equilibrium; acids and bases; properties and reactions of halogens and sulfur. Prep. 11-01; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-03 General Chemistry

Chemistry of nitrogen; qualitative analysis of cations; electrochemistry; principles of metallurgy; properties and reactions of alkali metals, alkaline earth metals, and boron family. Prep. 11-02; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-04 General Chemistry

Chemistry of carbon, silicon, tin, and lead. Terminology of organic chemistry. Hydrocarbons and their derivatives, petroleum and its refining, elements of polymer chemistry including rubber substitutes and plastics. Prep. 11-03; 3 Class Hrs.; 3 Lab. Hrs.; 2 Credit Hrs.

11-17 Quantitative Analysis

Theory and practice of volumetric analysis, standardization, neutralization, redox titrations. Prep. 11-04; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-18 Quantitative Analysis

Elements of instrumental analysis. Theory and use of colorimeter, absorption instruments, pH measurements, and chromatography. Prep. 11-17; 2 Class Hrs.; 3 Lab. Hrs.; 3 Credit Hrs.

11-26 Organic Chemistry

Molecular structure, nomenclature, properties, and reactions of aliphatic, alicyclic, and aromatic hydrocarbons. Synthesis and reactions of alcohols and phenols. Prep. 11-04; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-27 Organic Chemistry

Monofunctional compounds. Synthesis, properties, and reactions of halides, ethers, aldehydes, ketones, acids, ester, fats, amines, amides, nitriles, and azo compounds, with some attention to biological significance. Prep. 11-26; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-28 Organic Chemistry

Polyfunctional compounds. Substituted acids, quinones, dyes, stereoisomerism,

amino acids, carbohydrates, and proteins, with special emphasis on biological significance. Prep. 11-27; 4 Class Hrs.; 3 Lab. Hrs.; 5 Credit Hrs.

11-42 Chemical Literature

Uses of abstracting journals; types and sources of publications; patents as sources of information; sources of financial, statistical, and industrial information. Preparation of a detailed bibliography on an original topic. Preparation of written progress reports, typical research reports, etc. Prep. 11-55; 3 Class Hrs.; 3 Credit Hrs.

11-43, 11-44 Senior Research

Experimental work under direction of staff members. Approval of department head necessary. Each course carries 3 credits and extends throughout a single term. 9 Lab. Hrs.; 3 Credit Hrs.

11-45 Biological Chemistry

Chemistry of metabolism. Electrolytic equilibrium, elementary reaction mechanisms, catalysis, oxidation-reduction. Enzymes. Metabolism of carbohydrates, proteins, fats, and nucleic acids. Prep. 11-53 or 11-28; 4 Class Hrs.; 4 Credit Hrs.

11-46 General Chemistry

For chemistry majors only. Atomic structure, valence, periodicity, symbolism, and nomenclature; molecular substances, states of matter, kinetic theory; solutions; ionic compounds; electron- and proton-transfer. 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-47 General Chemistry

For chemistry majors only. Chemical equilibrium; ionization, electrolytic equilibrium, acidity, and basicity; group properties of the representative elements; inorganic synthesis and analysis. Prep. 11-46; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-48 General Chemistry

For chemistry majors only. The related metals; coordination compounds; electrochemistry; lanthanides and actinides; nuclear reactions; colloidal dispersions. Prep. 11-47; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-49 General Chemistry

Carbon compounds. Structure and nomenclature of hydrocarbons and the principal classes of organic functional compounds. Laboratory: simplified semimicro qualitative analysis of organic compounds. Prep. 11-48; 3 Class Hrs.; 3 Lab. Hrs.; 2 Credit Hrs.

11-50 Organic Chemistry

Syntheses, properties and reactions of aliphatic, aromatic and alicyclic monofunctional compounds of the principal types. Electronic interpretation of reactions. Prep. 11-49; 3 Class Hrs.; 6 Lab. Hrs.; 5 Credit Hrs.

11-51 Organic Chemistry

Aliphatic compounds. Preparation, properties and reactions of the more common classes of open-chain compounds. Electronic interpretation of structures and reactions. Prep. 11-04; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-52 Organic Chemistry

Continuation of 11-50. Prep. 11-50; 3 Class Hrs.; 6 Lab. Hrs.; 5 Credit Hrs.

11-53 Organic Chemistry

Bifunctional and multifunctional compounds. Stereoisomerism. Correlation of color with structure. Polymers. Prep. 11-52; 3 Class Hrs.; 3 Lab Hrs.; 4 Credit Hrs.

11-54 Organic Chemistry

Aromatic compounds. Preparation, properties and reactions of the more common classes of aromatic compounds. Electronic interpretation of structures and reactions of aromatic compounds. Prep. 11-51; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-55 Organic Chemistry

Heterocyclic compounds. Mechanisms of organic reactions. Correlation of structure with acidity, basicity and reaction rates. Perhalocarbons and their derivatives. Prep. 11-53; 3 Class Hrs.; 3 Credit Hrs.

11-56 Organic Chemistry

Carbohydrates, fats, proteins, dyes, synthetic resins, commercial solvents and other important industrial products such as petrochemicals. Prep. 11-52 or 11-54; 3 Class Hrs.; 3 Credit Hrs.

11-57 Qualitative Organic Analysis

Qualitative analysis of organic compounds having one of two functional groups. Single liquids, single solids, liquid mixtures, solid mixtures, and some industrial products are analyzed. Prep. 11-52; 9 Lab. Hrs.; 3 Credit Hrs.

11-58 Organic Preparations

Advanced organic preparations, based on recent literature, and selected to teach the laboratory techniques necessary for graduate school or industrial organic research. Prep. 11-52; 9 Lab. Hrs.; 3 Credit Hrs.

11-61 Physical Chemistry

The three states of matter. Solutions. Thermochemistry. Prep. 11-52 or 11-54; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-62 Physical Chemistry

Chemical thermodynamics. Prep. 11-61; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-63 Physical Chemistry

Solutions of electrolytes: transference and conductance, theory of electrolytic solutions, ionic equilibria, electromotive force, electrolysis and polarization. Prep. 11-62; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-64 Physical Chemistry

Kinetics, colloidal dispersions, correlation of physical properties with molecular constitution, and X-ray analysis of crystal structure. Prep. 11-63; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-65 Physical Chemistry

Covers the same class material as 11-63 but does not include laboratory. Prep. 11-62; 3 Class Hrs.; 3 Credit Hrs.

11-70 Quantitative Analysis

Theory and practice of gravimetric and volumetric analysis. Analysis of certain inorganic elements. Use of electrolytic methods. Statistical treatment of data. Prep. 11-62; 5 Class Hrs.; 6 Lab. Hrs.; 3 Credit Hrs.

11-71 Quantitative Analysis

Theory and practice of gravimetric and volumetric analysis. Calibration of glassware; acidimetry and alkalinity, neutralization and precipitation methods; the use of indicators. Prep. 11-70; 3 Class Hrs.; 6 Lab. Hrs.; 5 Credit Hrs.

11-73 Analytical Chemistry

Use of instrumental and physicochemical methods in analytical chemistry, including the types of instruments available, and the theory of their operation. Prep. 11-62; 2 Class Hrs.; 3 Lab. Hrs.; 3 Credit Hrs.

11-76 Instrumental Analysis

Use of instrumental and physicochemical methods in analytical chemistry, including the types of instruments available, and the theory of their operation. Prep. 11-71; 3 Class Hrs.; 6 Lab. Hrs.; 5 Credit Hrs.

11-77 Instrumental Analysis

Use of instrumental methods in analytical chemistry, including types of instruments available and the theory of their operation. Prep. 11-18; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-81 Inorganic Chemistry

Electronic structure, the periodic tables, nature of covalent and electrovalent bonds as illustrated by the chemistry of non-metals. Prep. 11-62; 3 Class Hrs.; 3 Credit Hrs.

11-82 Inorganic Chemistry

Electronic structure, the periodic table, and the nature of covalent and electrovalent bonds as illustrated by the chemistry and structure of metals. Prep. 11-81; 3 Class Hrs.; 3 Credit Hrs.

11-91 Special Topics

Advanced topics in physical chemistry. Topics vary from year to year. Prep. 11-64; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

11-92 Special Topics

Discussion of advanced topics in organic chemistry. Topics vary from year to year. Prep. 11-55; 3 Class Hrs.; 3 Credit Hrs.

11-93 Nuclear Chemistry

Radioactivity, nuclear reactions, atomic fission, properties of isotopes, use of radioactive tracers. Prep. 11-64; 3 Class Hrs.; 3 Credit Hrs.

Graphic Science

12-51 Engineering Graphics I

Graphic representation: graphical methods for the communication, visualization, and analysis of ideas and concepts related to creative engineering. 3 Class Hrs.; 3 Lab. Hrs.; 3 Credit Hrs.

12-52 Engineering Graphics II

Descriptive Geometry: 3-dimensional geometry in the visualization, analysis, and synthesis of graphical solutions for spatial relationship problems. Prep. 12-51; 3 Class Hrs.; 3 Lab. Hrs.; 3 Credit Hrs.

12-53 Engineering Graphics III

Graphical Processes: graphical solutions of mathematical and physical problems using coplanar, pictorial, and multiview representations of scientific diagrams and technical charts. Prep. 12-52; 3 Class Hrs.; 3 Lab. Hrs.; 3 Credit Hrs.

12-54 Engineering Graphics IV

Synthesis of representational, geometric, and analytical methods in the graphical conceptualization and development of engineering designs and solutions. Prep. 12-53; 3 Class Hrs.; 3 Lab. Hrs.; 2 Credit Hrs.

12-61 Graphical Computation

Geometrical representation, analysis, and solution of mathematical and physical problems by graphical methods. 6 Class Hrs.; 3 Credit Hrs.

12-63 Chart Analysis

Evaluations and predictions based on facts and relationships depicted on various types of charts and graphs. 5 Class Hrs.; 2 1/2 Credit Hrs.

12-65 Elements of Nomography

Graphical solutions of equations through alignment diagrams based on plane geometry relationships. 6 Class Hrs.; 3 Credit Hrs.

12-67 Introduction to Cartography

Analysis of maps and their cultural, historical, sociological, economic, geopolitical, etc., implications. 6 Class Hrs.; 3 Credit Hrs.

12-68 Geometry in Cartography

Systems of map projection and their effect on representations of the earth's geographical features. 6 Class Hrs.; 3 Credit Hrs.

12-69 Illustration for Teachers

Survey and development of methods for supplementing and illustrating oral classroom presentations. 4 Class Hrs.; 4 Lab. Hrs.; 3 Credit Hrs.

Geology

13-04 Historical Geology

How and when did the earth begin and what changes have taken place since its beginning? Geologic periods. Land form changes, forces causing these changes; particular plants and animals common to each period. Geologic history of the eastern United States. 5 Class Hrs.; 2 1/2 Credit Hrs.

13-05 Physical Geology

Structure of the earth and forces acting to shape the various topographical formations. Introduction to rocks and minerals; geological principles of weathering, erosion, diastrophism, and volcanism. 5 Class Hrs.; 2 1/2 Credit Hrs.

Mathematics

14-05 Differential Calculus

Continues from 14-54. Differentiation of algebraic and transcendental functions; partial and total differentiation; maxima and minima; indeterminate forms; infinite series. Prep. 14-54; 4 Class Hrs.; 4 Credit Hrs.

14-06 Integral Calculus

Methods of integration; indefinite, definite integrals; constant of integration; rectangular and polar coordinates; areas, center of gravity; moment of inertia; length of arc; volumes; areas of surfaces of revolution; multiple integrals. Prep. 14-05; 4 Class Hrs.; 4 Credit Hrs.

14-07 Differential Equations

Elementary theory and solution of ordinary differential equations. Properties of equations and of their solutions. Applied problems. Series solutions. Prep. 14-06 or 14-66; 4 Class Hrs.; 4 Credit Hrs.

14-08 Differential Equations

Methods of solution. Theory of differential equations. Special methods for second and higher order equations and linear equations; algebra of linear operators; Leplace transforms; method of Picard; first and second order partial differential equations; existence theorems for first and nth order equations and for systems of first order equations. Prep. 14-07; 4 Class Hrs.; 4 Credit Hrs.

14-11 Theory of Equations

Theory and analysis of equations and polynomials; continuity; complex numbers; equations of higher degree; discriminants; theorems on roots; fundamental theorem of algebra; symmetric functions. Prep. 14-06 or 14-66; 5 Class Hrs.; 2-1/2 Credit Hrs.

14-13 Computer Programming

Introduction to the programming of digital computers; machine languages, interpretive routines, compilers. Study of one language for a specific computer; laboratory exercises in solution of practice problems at the computation center. Prep. 14-06 or 14-66; 4 Class Hrs.; 2 Lab. Hrs.; 2 1/2 Credit Hrs.

14-14 History of Mathematics

Development of the various branches of mathematics; the lives of men who have made outstanding contributions to mathematical science; growth of mathematical knowledge and the development of civilization. Prep. 14-06 or 14-66; 5 Class Hrs.; 2 1/2 Credit Hrs.

14-15 Advanced Calculus

Theorems on limits and continuity; differentiability; mean-value theorems; Riemann definite integral; differentiation of integrals; Taylor's formula with remainder; indeterminate forms. Prep. 14-06 or 14-66; 4 Class Hrs.; 4 Credit Hrs.

14-16 Advanced Calculus

Partial differentiation; extrema with constraints; Lagrange's method and multipliers; Taylor's series for two variables; Jacobians; line integrals; transformation of multiple integrals; improper integrals and Laplace transforms. Prep. 14-15; 4 Class Hrs.; 4 Credit Hrs.

14-17 Infinite Series

Limits; infinite series; tests of convergence and divergence; algebraic operations; integration and differentiation; integration by means of series; applications and uses of special series; solution of differential equations by series. Prep. 14-07; 4 Class Hrs.; 4 Credit Hrs.

14-20 Advanced Mathematics for Engineers

Series solution of differential equations; Gamma function; Bessel functions; Fourier series; boundary value problems, vector analysis. Prep. 14-07; 3 Class Hrs.; 3 Credit Hrs.

14-21 Basic Mathematics I

Stress upon basic mathematical concepts as well as applications. Logical development of the real and complex number systems; solution of linear, quadratic, and simultaneous equations. 3 Class Hrs.; 3 Credit Hrs.

14-22 Basic Mathematics II

Algebra of sets; permutations and combinations; fundamentals of plane

trigonometry, including law of sines and law of cosines; elements of analytic geometry, including equations of straight line and circle. Prep. 14-21; 3 Class Hrs.; 3 Credit Hrs.

14-23 Basic Mathematics III

Functions and their graphs; sequences and limits; introduction to differential and integral calculus with applications; fundamentals of probability and statistics. Prep. 14-22; 3 Class Hrs.; 3 Credit Hrs.

14-28 Mathematical Statistics

Probability theory; basic principles of statistical inference; classification of data; moments of empirical and theoretical distributions; moment-generating functions; binomial, Poisson, and normal distributions; random sampling; testing of hypotheses; empirical linear correlation and regression. Prep. 14-06 or 14-66; 4 Class Hrs.; 4 Credit Hrs.

14-29 Mathematical Statistics

Normal distribution for two variables as a model for correlation and regression; chi-square distribution; confidence interval estimation; Student's t-distribution; Snedecor's F-distribution; analysis of variance, sampling inspection, sequential analysis, and non-parametric methods. Prep. 14-28; 4 Class Hrs.; 4 Credit Hrs.

14-30 Finite Mathematics

For Industrial Engineers. An introduction to logic, sets, probability theory, determinants, and matrices. Prep. 14-06 or 14-66; 5 Class Hrs.; 2 1/2 Credit Hrs.

14-31 Geometries

Development of various systems of geometry from a common foundation; geometry and calculus of three dimensions. Role of the parallel postulate in the geometry of Euclid and in the non-Euclidean geometries. Space geometry. Prep. 14-06 or 14-66; 4 Class Hrs.; 4 Credit Hrs.

14-33 Vector Analysis

Vector algebra, calculus of vectors, the del operator, line integrals, vector spaces. Prep. 14-06 or 14-66; 4 Class Hrs.; 4 Credit Hrs.

14-35 Numerical Analysis

Methods for the approximate solution of algebraic, transcendental, and differential equations; definite integrals, analysis of tabulated data. Prep. 14-07; 4 Class Hrs.; 4 Credit Hrs.

14-37 Abstract Algebra I

Introduction to modern algebra. Algebra of matrices and cononical forms; groups of transformations; systems of linear equations; linear vector spaces. Prep. 14-06 or 14-66; 4 Class Hrs.; 4 Credit Hrs.

14-38 Abstract Algebra II

Algebraic systems; groups, integral domains, rings, and fields. Prep. 14-37; 4 Class Hrs.; 4 Credit Hrs.

14-41 Fundamentals of Mathematics I

For Business Administration and non-science Liberal Arts students. Basic mathematical concepts and applications. Logical development of number systems; linear, quadratic and simultaneous equations; exponents, radicals, and logarithms; elements of analytic geometry. 8 Class Hrs.; 4 Credit Hrs.

14-42 Fundamentals of Mathematics II

Algebra of sets; permutations and combinations; probability and statistics; fundamentals of trigonometry. Prep. 14-41; 5 Class Hrs.; 2 1/2 Credit Hrs.

14-43 Fundamentals of Mathematics III

Functions and graphs; introduction to differential and integral calculus with applications. Prep. 14-42; 5 Class Hrs.; 2 1/2 Credit Hrs.

14-44 Mathematical Principles I

A first course for Economics majors. Review of algebra: fractions, powers and roots, equations, logarithms. Selected topics from analytic geometry and differential calculus, including applications of first and second derivatives to maximum and minimum problems. 4 Class Hrs.; 4 Credit Hrs.

14-45 Mathematical Principles II

Binomial expansion; permutations and combinations; probability theory; matrices; linear programming; theory of games. Prep. 14-44; 4 Class Hrs.; 4 Credit Hrs.

14-51 Mathematics I

For engineering students only. Algebraic and trigonometric functions; equations, inequalities, and identities involving these functions. Prep. 3 1/2 units of college preparatory mathematics; 5 Class Hrs.; 4 Credit Hrs.

14-52 Mathematics II

Plane analytic geometry; straight line, circle, conics; introduction to differential calculus. Prep. 14-51; 5 Class Hrs.; 4 Credit Hrs.

14-53 Mathematics III

Determinants; vector algebra; elements of solid analytic geometry; graphs of transcendental functions; continuation of differential calculus; introduction to integration. Prep. 14-52; 5 Class Hrs.; 5 Credit Hrs.

14-54 Mathematics IV

Polar coordinates; complex numbers; progressions; infinite series; permutations and combinations; binomial theorem. Prep. 14-53; 5 Class Hrs.; 2 1/2 Credit Hrs.

14-61 Mathematical Analysis I

For chemistry, mathematics, physics, and education science majors. Introduction to analytic geometry and differential calculus. Prep. 3 1/2 units of college preparatory mathematics; 5 Class Hrs.; 4 Credit Hrs.

14-62 Mathematical Analysis II

Indefinite and definite integral; transcendental functions. Prep. 14-61; 5 Class Hrs.; 4 Credit Hrs.

14-63 Mathematical Analysis III

Methods of integration; determinants; further topics in plane analytic geometry; hyperbolic functions. Prep. 14-62; 5 Class Hrs.; 5 Credit Hrs.

14-64 Mathematical Analysis IV

Applications of integral calculus; combinations; permutations; probability; statistics. Prep. 14-63; 5 Class Hrs.; 2 1/2 Credit Hrs.

14-65 Mathematical Analysis V

Methods of integration, approximate integration, volume of revolution, length of arc, surface area of revolution, and average value of a function. Parametric equations, determinants, and vector analysis. Prep. 14-64; 4 Class Hrs.; 4 Credit Hrs.

14-66 Mathematical Analysis VI

Total differential, partial derivatives, multiple integrals, indeterminate forms, and infinite series. Prep. 14-65; 4 Class Hrs.; 4 Credit Hrs.

Physics

15-15 Advanced Physics

For chemistry majors only. A brief study of experimental spectroscopy. General optical principles of spectroscopic apparatus, prism spectroscopes and spectrographs, the photographic process, slit width and illumination, the diffraction grating, types of mounting for the grating, the Bohr-Sommerfeld atom, the origin of atomic spectra, the spectra of the hydrogen and sodium atoms and quantum numbers. Prep. 14-06, 15-56; 3 Class Hrs.; 2 Lab. Hrs.; 4 Credit Hrs.

15-16 Electricity and Magnetism

Electrostatics, dielectrics, Gauss' Law, solutions of LaPlaces's equation. Magnetostatics, Ampere's and Faraday's Laws, transients, Maxwell's equations. This course leads to course 15-61. Prep. 15-56, 14-08; 3 Class Hrs.; 4 Credit Hrs.

15-17 Mechanics

Vector analysis, Newton's laws of motion, kinematics and dynamics of particles, kinetic and potential energy, conservative forces, central forces, moving co-ordinate systems. Prep. 15-54, 14-06; 4 Class Hrs.; 4 Credit Hrs.

15-18 Mechanics

Kinematics and dynamics of systems of particles and rigid bodies, simple and compound pendulums, first and second moments, generalized co-ordinates, Lagrange's equations, small oscillations. Prep. 15-17, 14-07; 4 Class Hrs.; 4 Credit Hrs.

15-26 Modern Physics

Molecular relationships, atomic nature of matter and electricity, corpuscular nature of radiant energy, quantum mechanics, wave theory of matter, atomic structure, spectroscopy and X-ray production and measurement. Prep. 14-06, 15-56; 4 Class Hrs.; 4 Credit Hrs.

15-27 Modern Physics

Atomic spectra, molecular spectra, periodic system, radioactivity, alpha, beta, and gamma ray spectra, nuclear structure and devices for studying these phenomena; artificial transmutation processes, fission and cosmic rays. Prep. 15-26; 4 Class Hrs.; 4 Credit Hrs.

15-31 Atomic and Nuclear Physics

Chronological outline of the development of theories of the nucleus. Alpha, beta, and gamma ray spectra and their interaction with matter. Neutrino, pair formation and mesons. Scattering and cross sections. Prep. 14-07, 15-27; 4 Class Hrs.; 4 Credit Hrs.

15-32 Atomic and Nuclear Physics

Those parts of quantum theory and relativity having a bearing on the study of the nucleus. Nuclear structure, statistics and forces. Majorana, Heisenberg forces and modern theories. Prep. 15-31; 4 Class Hrs.; 4 Credit Hrs.

15-33 Quantum Mechanics

Breakdown of classical theory, origin of the quantum theory, wave packets and DeBroglie waves; uncertainty principle; Shrodinger equation; solution of one-dimensional problems. Prep. 14-08, 15-27; 4 Class Hrs.; 4 Credit Hrs.

15-34 Quantum Mechanics

Three-dimensional problems; the hydrogen atom; time independent theory and application to the helium atom. Prep. 15-33; 4 Class Hrs.; 4 Credit Hrs.

15-41 Introduction to Atomic and Nuclear Physics

Equivalence of mass and energy; the quantum theory; wave nature of particles; kinetic theory; atomic structure; periodic system; nuclear structure; radioactivity; radioactive decay laws; nuclear reactions; cross sections. Prep. 14-06, 15-56; 4 Class Hrs.; 4 Credit Hrs.

15-51 Physics

Simple motion of a particle; Newton's laws; operational concepts of momentum; law of gravitation. 3 Class Hrs.; 3 Credit Hrs.

15-52 Physics

Work; energy; impulse; momentum; conservation laws. Prep. 15-51; 3 Class Hrs.; 3 Credit Hrs.

15-53 Physics

Application of the principles in 15-51 and 15-52 to rigid bodies; fluid mechanics; kinetic theory; heat conduction; isothermal and adiabatic processes. Prep. 15-52; 3 Class Hrs.; 3 Credit Hrs.

15-54 Physics

Wave motion and sound. Prep. 15-53; 5 Class Hrs.; 2 1/2 Credit Hrs.

15-55 Physics

Microscopic treatment of electricity and magnetism; electrostatics developed from the Coulomb's law and field viewpoints; magnetostatics. Faraday's induction law, the Bohr-Sommerfeld atom, and the atomic view of electricity. Prep. 15-54, 14-54; 4 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

15-56 Physics

General problem of electromagnetic radiation including spectra, physical and geometric optics. Prep. 15-55; 4 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

15-61 Optics

Extends techniques of electromagnetic theory to problems of physical optics. Maxwell's equations, propagation of electromagnetic radiation in isotropic and nonisotropic media; reflection and refraction at the boundary between two media; interference and diffraction from the standpoint of Huygens-Fresnel and Kirchoff. Prep. 15-16, 14-08; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

15-62 Vibration and Sound

Fundamental principles of vibration and waves in elastic media. Transmission and interference phenomena. Experimental work largely in the field of sound. Prep. 15-16, 15-18; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

15-63 Advanced Physics

For chemistry majors only. Laboratory course in electronic measurements. Principles and concepts of modern physics. Each period starts with a discussion of the principle to be studied. Prep. 14-66, 15-56; 3 Lab. Hrs.; 1 Credit Hr.

15-64 Solid State Physical Electronics

Introduction to the application of solid state to electronics. Structure of the solid state, electron emission and semiconductor devices. Prep. 15-56, 14-66; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

15-65 Solid State Physical Electronics

For electrical engineering students. Similar to 15-64 but without laboratory. Prep. 15-56, 14-06; 3 Class Hrs.; 3 Credit Hrs.

Physical Education

16-10, 11, 12 Physical Education

All first-year students are required to take Physical Education or ROTC. Participation in athletic games and sports. For women there are team and individual sports, dance, and posture improvement. Students wishing to be excused from physical training because of physical defects are required to present a petition to the faculty supported by a physician's certificate. 0 Credit Hrs.; 2 Lab. Hrs.

16-15 Anatomy & Physiology

Introduction to the basic concepts of the body as a whole and to the study of Osteology (bones). 3 Class Hrs.; 3 Credit Hrs.

16-16 Anatomy & Physiology

Study of syndesmology (ligaments) and myology (muscles). 3 Class Hrs.; 3 Credit Hrs.

16-17 Anatomy & Physiology

Study of the body systems. 3 Class Hrs.; 3 Credit Hrs.

16-18 Individual Sports

Development of skills in such sports as handball, badminton, tennis, golf, wrestling, boxing, swimming. 4 Credit Hrs.; 8 Lab. Hrs.

16-19 Individual Sports

A continuation of 16-18. 2 Lab. Hrs.; 2 Credit Hrs.

16-20 Individual Sports

A continuation of 16-19. 2 Lab. Hrs.; 2 Credit Hrs.

16-23 History of Physical Education

Physical education from the days of the Greeks and Romans to the present. Special systems of training developed in the United States and foreign countries. Required of all students electing Physical Education as a minor field. 4 Class Hrs.; 4 Credit Hrs.

16-24 Organization and Administration of Physical Education

Administrative problems in the field of physical education. Objectives of physical education program, personnel required, gymnasias, athletic fields and construction and maintenance of these units. Requirements for equipment, arrangements of schedules, coaching, meets, etc. Required of all students electing Physical Education as a minor field. 4 Class Hrs.; 4 Credit Hrs.

16-25 Football

Furnishes the student interested in football coaching with a thorough knowledge of the sport. Consideration of fundamentals, the plays of each position in the line and backfield, offensive and defensive systems, adaptations to particular situations, training and conditioning, rules and interpretation, and officiating. 4 Class Hrs.; 4 Credit Hrs.

16-26 Track and Field Events

Care and training of track athletes; practice schedules; selection of material; conduct of meets; coaching technique, etc. 4 Class Hrs.; 4 Credit Hrs.

16-27 Basketball and Baseball

The basketball section of the course deals with organizing and conducting basketball as a phase of interschool competition. Basic fundamentals, techniques and different systems of individual and team play. The baseball section covers the job of the coach in either high school or college. Techniques of individual and team play in fundamentals and strategy. 4 Class Hrs.; 4 Credit Hrs.

16-28 Calisthenics and Gymnastics

Basic preparation for exercises and gymnastics; knowledge necessary for the development of programs. Practice is combined with analysis and correction as needed. 4 Class Hrs.; 4 Credit Hrs.

16-31 Kinesiology

Laws of mechanics as applied to human motion and muscular activities; application to physical education, sports, and athletics. 4 Class Hrs.; 4 Credit Hrs.

16-32 Physiology of Exercise

Interrelationships among body functions and organs, muscular action, and physical activities of all kinds. 4 Class Hrs.; 4 Credit Hrs.

16-33 Personal Hygiene

Principles of healthful personal living; maintenance of health and body efficiency; their application to interpersonal relations and athletics. 4 Class Hrs.; 4 Credit Hrs.

16-34 Community Health and Safety

Preventive medicine in its relation to the community; emphasis on the school population, health agencies, and functions in community sanitation and safety. 4 Class Hrs.; 4 Credit Hrs.

16-35 Prevention and Care of Injuries

Methods of preventing injuries as well as their care; conditioning and safety in the conduct of physical education and athletics; postural and structural weaknesses in the physically handicapped and their rehabilitation. 4 Class Hrs.; 4 Credit Hrs.

16-36 Advanced Gymnastics

A continuation of 16-28. Various skills in tumbling and apparatus; place of exercise in physical education programs for typical and atypical children. 4 Class Hrs.; 4 Credit Hrs.

16-37 Rhythms and Recreation

Study and practice of rhythms as applied to various dances and games; organization of basic recreation programs in school and community. 4 Class Hrs.; 4 Credit Hrs.

16-38 Camp Organization and Leadership

Camp organization; planning of various modes of camping; the planning of programs; personnel requirements as they affect school, community, and seasonal camp activities; types of counseling procedures. 4 Class Hrs.; 4 Credit Hrs.

Natural Sciences

17-01 Survey of Physical Sciences

Introduction to the nature of science and how it develops, with most illustrations drawn from the history of astronomy. Demonstrations, visual aids, and field trips. 3 Class Hrs.; 3 Credit Hrs.

17-02 Survey of Physical Sciences

Major emphasis in the field of physics. Simple machines; work and power; heat and electricity; sound waves; and physical and geometric optics. 3 Class Hrs.; 3 Credit Hrs.

17-03 Survey of Physical Sciences

Introduction to physical geology, including composition of the earth and forces governing its physical features; the atmosphere, weather elements, and weather forecasting. 3 Class Hrs.; 3 Credit Hrs.

17-04 Survey of Physical Sciences

Introduction to basic chemical concepts. Nuclear chemistry with emphasis on a better understanding of atomic energy. 4 Class Hrs.; 2 Credit Hrs.

17-11 Introduction to Natural History

Animals of the seashore, spiders, insects, amphibians, and reptiles. Identifying characteristics, life history, ecological relationships, and economic importance of specific animals in each group. 3 Class Hrs.; 3 Credit Hrs.

17-12 Introduction to Natural History

Fish, birds, and mammals complete the study of the animal kingdom. The natural history of algae, fungi, mosses, ferns, and higher plants. 3 Class Hrs.; 3 Credit Hrs.

Evening Offerings in Natural Sciences

- Sc 1 Survey of the Physical Sciences
Sc 2 Survey of the Biological Sciences
Sc 3-4 General Biology
Sc 7-8 Physics
Sc 9-10 General Chemistry
 (For course descriptions see separate Evening Session Bulletin of the
 College of Liberal Arts)

Economics

20-01 Economic Geography

Physical geography; resource distribution; and the development of agriculture and industry, with emphasis upon basic economic institutions. 3 Class Hrs.; 3 Credit Hrs.

20-02 International Economic Geography

Resources and institutions of the countries of the world, including regional aspects and underdeveloped areas. Prep. 20-01; 3 Class Hrs.; 3 Credit Hrs.

20-04 Introduction to Economics

Primarily an institutional approach. Survey of basic economic aspects - national income, business organization, labor, the banking system, etc. 3 Class Hrs.; 3 Credit Hrs.

20-06 Principles and Problems of Economics

Introduction to economic theory and problems. Business cycles, money and the banking system, fiscal policy, economic growth, fluctuations in national income. 4 Class Hrs.; 4 Credit Hrs.

20-07 Principles and Problems of Economics

Economic problems of agriculture, monopoly, industrial relations. International economic problems and competing economic systems. 4 Class Hrs.; 4 Credit Hrs.

20-11 Economics

For engineering students. A survey of basic economic principles. The structure of the American economy, money and banking system, production, pricing and distribution in a competitive economic system. 3 Class Hrs.; 3 Credit Hrs.

20-12 Economics

For engineering students. Analysis of national income, business cycles. Problems of economic growth, public financing, control of business and labor, agriculture and international trade. 3 Class Hrs.; 3 Credit Hrs.

20-13 Economic Principles

Fundamental laws and principles of economic analysis. Price theory, basic concepts of income distribution. 8 Class Hrs.; 4 Credit Hrs.

20-16 Accounting Principles

For liberal arts students only. Fundamental concepts of accounting. Introduction to accounting terminology. Preparation and analysis of financial statements. 4 Class Hrs.; 4 Credit Hrs.

20-17 Accounting Principles

Corporate financial reporting, long-term liabilities and investments, cost analysis and financial planning. Accounting presented as an analytical tool of management. Prep. 20-16; 4 Class Hrs.; 4 Credit Hrs.

20-18 American Economic History

Economic development of the United States from the colonial period to the present; emphasis upon the period since the Civil War. Consideration of related European developments. Prep. 20-11 or 20-13; 4 Class Hrs.; 4 Credit Hrs.

20-20 Statistics

Collection and organization of statistical data, frequency distributions, measures of central tendency, dispersion, and probability. 4 Class Hrs.; 4 Credit Hrs.

20-21 Statistics

Time series analysis; correlation analysis and construction of index numbers. Prep. 20-20; 3 Class Hrs.; 2 Lab. Hrs.; 4 Credit Hrs.

20-22 Industrial Statistics I

For industrial engineering majors only. Methods and applications of statistical analysis. Organization and presentation of statistical facts. Measures of central tendency, dispersion, time series analysis and index numbers. 4 Class Hrs.; 4 Lab. Hrs.; 4 Credit Hrs.

20-24 Money and Banking

Institutional aspects of our monetary and banking system. Problems and policies of central banking in the United States. Prep. 20-07 or 20-38; 4 Class Hrs.; 4 Credit Hrs.

20-25 Business Cycles

Theories of business cycles and their impact. Measurement of business fluctuations and forecasting. Analysis of forecasting services and business conditions. Prep. 20-21; 4 Class Hrs.; 4 Credit Hrs.

20-26 Labor Economics

Development of present-day labor organizations, their aims and methods. Issues involved in collective bargaining. Economic implications of labor

market policies. Public policy towards labor relations. Prep. 20-07 or 20-13; 3 Class Hrs.; 3 Credit Hrs.

20-27 International Economic Relations

Survey of the development of international commercial policies in recent times. Analysis of international economic principles and of international organizations. Prep. 20-07 or 20-38; 4 Class Hrs.; 4 Credit Hrs.

20-28 Economic Systems

Analysis and evaluation of different economic systems; capitalism, socialism, communism, and fascism. Prep. 20-18; 4 Class Hrs.; 4 Credit Hrs.

20-29 Intermediate Economic Theory

For economics majors only. Detailed development of classical equilibrium theory. The determination of prices and outputs. Theory of the firm. Introduction to mathematical analysis. 4 Class Hrs.; 4 Credit Hrs.

20-30 Intermediate Economic Theory

For economics majors only. Comprehensive analysis of the theory of distribution. 4 Class Hrs.; 4 Credit Hrs.

20-31 Advanced Economic Theory

For economics majors only. Advanced elements of macroeconomics integrated with macroeconomic variables. Theories of production, consumption, markets, the firm and the industry. Prep. 20-30; 4 Class Hrs.; 4 Credit Hrs.

20-32 Advanced Economic Theory

For economics majors only. Welfare implications of demand theory; general equilibrium analysis. Theories of interest and employment with emphasis on Keynesian economics. Problems of a growing economy. Prep. 20-31; 4 Class Hrs.; 4 Credit Hrs.

20-33 History of Economic Thought

Development of economic theory. The major contributions of the various schools of economic thought including the Keynesian school and later contributions. 4 Class Hrs.; 4 Credit Hrs.

20-37 Economic Principles

Comprehensive analysis of the economics of the firm. Areas such as: marginal analysis, best-profit level of output, market structures and production factors. Prep. 20-13; 3 Class Hrs.; 3 Credit Hrs.

20-38 Economic Principles

Application of economic principles to the solution of business problems. Evaluation of specific solutions. Prep. 20-30 or 20-37; 4 Class Hrs.; 4 Credit Hrs.

20-40 Business and Government

The role of government in economic affairs. The relationship between government and business. Theoretical analysis of interaction of various sectors of the economy. Prep. 20-30 or 20-38; 4 Class Hrs.; 4 Credit Hrs.

20-51 Public Finance

History of United States public economy. Intergovernmental fiscal relations. Growth and development of the public economy as a part of the national economy. Public finance policies. Prep. 20-24; 4 Class Hrs.; 4 Credit Hrs.

20-58 Personal Finance

Planning of personal expenditures, borrowing, budgeting, and building an estate. Prep. 20-12 or 20-13; 5 Class Hrs.; 2-1/2 Credit Hrs.

20-59 Federal Income Taxes

Brief survey of the Federal tax structure. Application of tax principles to specific problems. (Not open to Accounting majors.) Prep. 20-17 or 41-03; 5 Class Hrs.; 2-1/2 Credit Hrs.

20-65 Research Methods

Introduction to quantitative methods of business research. The theory of sampling and methods of statistical inference. Practical problems encountered in making sample surveys. Course is offered to qualified seniors. Prep. 20-21; 4 Class Hrs.; 4 Credit Hrs.

Evening Offerings in Economics

Ec 1-2 Economic Principles and Problems

Ec 3-4 Financing Business Operations

Ec 5-6 Financial Policy and Planning

Ec 7 Investment Principles

Ec 8-9 Applied Security Analysis

Ec 10 Management of Personal Finance

Ec 11 Economic Geography

Ec 12 Government Controls in Business

Ec 20-21 Statistics

Ec 30 International Economics

Ec 31 Managerial Economics

Ec 32 Monetary Policy

Ec 33 Business Cycles and Forecasting

(For course descriptions see separate Evening Session Bulletin of the College of Liberal Arts)

Education

Methods and Materials in Secondary School Teaching Majors

- | | |
|---|---------------------------------|
| 21-20 Methods and Materials - English |) Application of teaching |
| 21-22 Methods and Materials - Science |) principles previously devel- |
| 21-23 Methods and Materials - Mathematics |) oped to the specific teaching |
| 21-25 Methods and Materials - Social Studies |) major. 3 Class Hrs.; 3 |
| 21-28 Methods and Materials - Industrial Arts |) Credit Hrs. |

21-29 Methods and Materials - Physical Education

Methods of teaching physical education in elementary and secondary schools. Problems of scheduling, balanced programs, materials, and equipment. 3 Class Hrs.; 3 Credit Hrs.

21-30 Measurement and Evaluation in Physical Education

Evaluation of student progress in physical education programs. Testing the general effectiveness of teaching and organizational methods. 3 Class Hrs.; 3 Credit Hrs.

21-31 Elementary Language Arts

Function of language arts in the elementary school program, materials and methods for their teaching. Students will examine available resources and develop suitable materials. 3 Class Hrs.; 3 Credit Hrs.

21-32 Reading in Elementary Schools

Specific methods and materials necessary to develop a sound and continuous program of reading in the elementary grades. 3 Class Hrs.; 3 Credit Hrs.

21-37 Arts and Crafts in Elementary Schools

Students work with materials appropriate to an art program at the elementary school level. 3 Class Hrs.; 3 Credit Hrs.

21-38 Elementary School Music

Methods and materials helpful in developing an elementary school music program. 3 Class Hrs.; 3 Credit Hrs.

21-39 Elementary School Social Studies

Social problems that can be handled at the elementary level based on child development concepts. An attempt will be made to see the program as a possible core of the elementary curriculum. 3 Class Hrs.; 3 Credit Hrs.

21-40 Student Teaching with Related Seminar

Opportunity in a public school to assume responsibility for organizing learning experiences in the major area under expert supervision. Separate seminars for elementary and secondary majors run concurrently with the student teaching periods and deal with problems encountered in the classroom. 14 Credit Hrs.

21-41 Fundamental Concepts of Arithmetic I

Meaning theory aimed toward the development of facility with and insight into the basic concepts of arithmetic. 3 Class Hrs.; 3 Credit Hrs.

21-42 Fundamental Concepts of Arithmetic II

Continued basic general objective of 21-41. 3 Class Hrs.; 3 Credit Hrs.

21-44 Methods and Materials - Elementary Science and Arithmetic

A laboratory course. Development of materials and methods for the teaching of science and arithmetic in the elementary school program. 3 Class Hrs.; 3 Credit Hrs.

21-45 Growth and Development

Major factors related to human growth and development. Importance of learning and adjustment. 8 Class Hrs.; 4 Credit Hrs.

21-49 Health and Recreation

Scope, methods and materials of elementary school physical education program. 3 Class Hrs.; 3 Credit Hrs.

21-50 Special Education

Nature and problems of exceptional children, including the retarded, the gifted, those with speech and hearing defects, brain injury, etc. 3 Class Hrs.; 3 Credit Hrs.

21-51 Human Development and Learning I

Developmental processes of elementary school children. Physical growth, intellectual growth, language development and social development. Prep. social science or sociology; 3 Class Hrs.; 3 Credit Hrs.

21-52 Human Development and Learning II

Changing attitudes and concepts during adolescence. Individual differences in development and performance as related to physical, social and psychological factors. Prep. 21-51; 3 Class Hrs.; 3 Credit Hrs.

21-53 Learning and Teaching I

Intensive study of learning theories with emphasis on perception, motivation, concept formation, retention and transfer of learning. 3 Class Hrs.; 3 Credit Hrs.

21-53E Learning and Teaching I - Elementary Laboratory

A laboratory course for students preparing to teach in the elementary school and concurrently enrolled in 21-53. 2 Lab. Hrs.; 2 Credit Hrs.

21-53S Learning and Teaching I - Secondary Laboratory

A laboratory course for students preparing to teach in the secondary school and concurrently enrolled in 21-53. 2 Lab. Hrs.; 2 Credit Hrs.

21-54 Learning and Teaching II

Relationship of principles of learning to curriculum development; unit organization; classroom management. 3 Class Hrs.; 3 Credit Hrs.

21-54E Learning and Teaching II- Elementary Laboratory

A laboratory course for students preparing to teach in the elementary school and concurrently enrolled in 21-54. 2 Lab. Hrs.; 2 Credit Hrs.

21-54S Learning and Teaching II- Secondary Laboratory

A laboratory course for students preparing to teach in the secondary school and concurrently enrolled in 21-54. 2 Lab. Hrs.; 2 Credit Hrs.

21-55 Backgrounds of American Education I

Historical and philosophical roots of American schools; their old-world origins; American education up to the Civil War. 3 Class Hrs.; 3 Credit Hrs.

21-55S Backgrounds of American Education I

A course for summer students comparable with 21-55. 5 Class Hrs.; 2-1/2 Credit Hrs.

21-56 Backgrounds of American Education II

An extension of 21-55, especially the development of education in America since 1865. Major current issues. Prep. 21-55; 3 Class Hrs.; 3 Credit Hrs.

21-56S Backgrounds of American Education II

A course for summer students comparable with 21-56. 5 Class Hrs.; 2-1/2 Credit Hrs.

21-58 Measurement and Evaluation of Learning

Evaluation of student progress. Testing the general effectiveness of teaching methods. 3 Class Hrs.; 3 Credit Hrs.

21-60 Social Science I

Biological evolution of man and factors influencing his development. 3 Class Hrs.; 3 Credit Hrs.

21-61 Social Science II

Factors influencing the cultural development of man; methods of analysis utilized by anthropologists; specific studies of contemporary primitive peoples. Prep. 21-60; 3 Class Hrs.; 3 Credit Hrs.

21-62 Social Science III

Consideration of the individual in society; analysis of community structure; social institutions; social classes; social processes and change; contemporary trends and problems. Emphasis upon modern society. Prep. 21-61; 3 Class Hrs.; 3 Credit Hrs.

Government

22-01 American National Government

The Constitution; civil rights; problems of Federalism; political parties and public opinion. 3 Class Hrs.; 3 Credit Hrs.

22-02 American National Government

Organization and work of the Legislative, Executive, and Judicial branches of the government; problems in personnel, finance, and foreign relations. 3 Class Hrs.; 3 Credit Hrs.

22-03 American National Government

Scope and purpose of government activities and how they promote the general welfare. 3 Class Hrs.; 3 Credit Hrs.

22-04 Modern Democracy

The development of Communism in Russia and elsewhere and its struggle against Democracy. 3 Class Hrs.; 3 Credit Hrs.

22-05 Modern Democracy

Background, rise and evolution of American Democracy; its strengths and weaknesses in its conflict with Communism. 3 Class Hrs.; 3 Credit Hrs.

22-06 State and Local Government

Legal bases of state and local government as determined by constitutions. Structure of state and local government; various services of state and local government. 3 Class Hrs.; 3 Credit Hrs.

22-08 Current Political Issues

Contemporary national and international issues. Conflicting ideologies; protection of civil rights; specific issues in American foreign affairs. 3 Class Hrs.; 3 Credit Hrs.

22-10 American Political Parties

Origin, development, organization, principles, and programs of political parties in the United States; influence of pressure groups on party government. 4 Class Hrs.; 4 Credit Hrs.

22-11 Foreign Governments

Origin and development of parliamentary government as found in England and France. 4 Class Hrs.; 4 Credit Hrs.

22-12 Foreign Governments

The governments of the Soviet Union and Germany. 4 Class Hrs.; 4 Credit Hrs.

22-13 Political Theory

Basic ideas such as justice, liberty, and the organization of the state as expressed by writers from Plato through Machiavelli. 4 Class Hrs.; 4 Credit Hrs.

22-14 Political Theory

Writers of the Protestant Reformation followed by Royalist and anti-Royalist theorists; social contract writers, and the utilitarians. Communist political philosophy and Democracy's answer to it. 4 Class Hrs.; 4 Credit Hrs.

22-15 American Constitutional Law

Case study of American Federalism; judicial review; the commerce, fiscal, military, and other powers of Congress and the powers of the President in domestic and foreign affairs. 4 Class Hrs.; 4 Credit Hrs.

22-16 American Constitutional Law

Case study of state power to regulate economic affairs and to tax; rights of the accused; freedom of expression; electoral process; citizenship and alienage; intergovernmental immunities; interstate relationships. 4 Class Hrs.; 4 Credit Hrs.

22-17 International Politics

Principles underlying international politics. Foundations of power such as geography, ideas, and nationalism. The problem of world law and order in the contemporary international setting. 4 Class Hrs.; 4 Credit Hrs.

22-18 International Organization

Historical backgrounds; the League of Nations; the structure, functions, and problems of the United Nations and its specialized agencies. An analysis of world government. 4 Class Hrs.; 4 Credit Hrs.

22-20 Public Administration

Existing administrative structure and efforts at reorganization. Principles which should determine administrative organization and practice, and problems of finance administration. 4 Class Hrs.; 4 Credit Hrs.

22-21 Public Administration

Personnel administration; problem of holding administrative officers responsible by means of statutory limitations, judicial review, and other less formal methods. 4 Class Hrs.; 4 Credit Hrs.

22-22 International Law

Recognition, treaties, relation of international law to municipal law, treaties, state responsibility, and interpretation of the United Nations Charter. 4 Class Hrs.; 4 Credit Hrs.

22-23 American Foreign Policy

Role of the United States in world politics. Factors affecting American foreign policy and governmental mechanism for its conduct; specific contemporary problems. 4 Class Hrs.; 4 Credit Hrs.

22-24 American Political Thought

Development of formative political ideas from the colonial period to the Civil War. Puritanism, enlightenment theories of representation and revolution, constitutionalism, Jeffersonian and Jacksonian democracy, and theories supporting national union and states' rights. 4 Class Hrs.; 4 Credit Hrs.

22-25 American Political Thought

Political theory in the United States from the post-Civil War period to the present. Economic liberalism, progressivism, pragmatism, concluding with an examination of current theories of liberalism and conservation. 4 Class Hrs.; 4 Credit Hrs.

22-28 Modern Middle East

A political and historical survey of the Modern Middle East. Problems of feudalism and nationalism, and ethnic and religious minorities. 5 Class Hrs.; 2-1/2 Credit Hrs.

22-30 Soviet Foreign Policy

Role of the Soviet Union in world politics from 1917 to the present. 5 Class Hrs.; 2-1/2 Credit Hrs.

Evening Offerings in Government

- G 1-2 American Government
- G 3-4 Comparative Government
- G 10 Plato's Republic
- G 11-12 International Relations and Politics
- G 13 Current Political Issues
- G 14 American Politics and Political Parties
- G 15 American Foreign Policy
- G 17-18 Soviet Foreign Policy
- G 19 Modern Political Theory
- G 20 America as a Civilization
- G 23 Government and Politics of Underdeveloped Nations
- G 24 Modern Ideologies
- G 25 Politics and Administration
- G 26 Mass Media and Democratic Politics
- G 27 Contemporary World Problems
- G 28 City Life and Politics

(For course descriptions see separate Evening Session Bulletin of the College of Liberal Arts)

History

23-01 Western Civilization

Greek and Roman backgrounds of modern civilization; the Judeo-Christian tradition; the Germanic influence; Byzantium and Islam; the role of the Church; the early Middle Ages. 4 Class Hrs.; 4 Credit Hrs.

23-02 Western Civilization

The Crusades and their consequences; intellectual life in the Middle Ages; the rise of national states; the Papacy and its influence; the Renaissance and the Reformation. 4 Class Hrs.; 4 Credit Hrs.

23-03 Western Civilization

Religious struggles of the 16th and 17th centuries; the divine right monarchs; English revolutions of the 17th century; 18th century wars; the Enlightenment; the French Revolution; Napoleon and his downfall; the 19th century reaction; 4 Class Hrs.; 4 Credit Hrs.

23-04 Western Civilization

The Industrial Revolution and its impact; Darwinism and its implications; nationalism and chauvinism; World War I and its aftermath; the ideological struggle between the wars; World War II; the Cold War. 4 Class Hrs.; 2 Credit Hrs.

23-05 Recent American History

Need for reform; Progressive Era; war and reaction; depression and a new reform period. Rise of the United States as a world power. 4 Class Hrs.; 4 Credit Hrs.

23-06 Recent European History

Europe since 1914: World War I; Communism, Fascism and their impact; struggle for stability and social justice in the western democracies; World War II and the Cold War. 3 Class Hrs.; 3 Credit Hrs.

23-07 History of Soviet Russia

Forces which molded and continue to mold Soviet Russia. Social, economic, and intellectual factors in close correlation with important political developments. 4 Class Hrs.; 4 Credit Hrs.

23-08 Contemporary Orient

Twentieth century India and the Far East—their basic heritage, present institutions and programs, and importance to American foreign policy. Emphasis upon the career of Gandhi and his nonviolent alternatives to war. 4 Class Hrs.; 4 Credit Hrs.

23-09 Ancient Greece

Origins and development of Greek civilization; political evolution of Hellenic society from tribal to city-state organization; growth and application of Greek religious, political, and ethical ideas. Prep. 23-01; 4 Class Hrs.; 4 Credit Hrs.

23-10 Ancient Rome

Roman civilization in two sequences; the rise of Roman power under the Republic; the decline of Roman power under the Empire. Social, economic, intellectual, and religious expressions of each sequence. Prep. 23-02; 4 Class Hrs.; 4 Credit Hrs.

23-11 Eighteenth Century Europe (1700-1815)

Europe in the Age of Enlightenment when concepts were advanced to suggest sweeping changes in government and society. French Revolutionary era and its impact on European thought and institutions. 4 Class Hrs.; 4 Credit Hrs.

23-12 Nineteenth Century Europe (1815-1914)

Europe during a century of dramatic transformation. The post-Napoleonic reaction, the Industrial Revolution, Liberalism, Socialism, Nationalism, the rise of imperialism, and the diplomatic background of World War I. 4 Class Hrs.; 4 Credit Hrs.

23-13 England to 1688

Prehistoric Britain, the Normans, Tudor absolutism and the Stuarts through the Glorious Revolution. 4 Class Hrs.; 4 Credit Hrs.

23-14 England Since 1688

Decline of the monarchy; industrial revolution; reaction and reform in the 19th century; world wars and socialist Britain. 4 Class Hrs.; 4 Credit Hrs.

23-15 English Constitutional History

English constitution and common law; local government versus central government; origin and growth of Parliament; development of the British cabinet system; 4 Class Hrs.; 4 Credit Hrs.

23-16 American Constitutional History

Historical development of the Constitution of the United States with particular emphasis on its progressive adjustment to the changing social and economic order. 4 Class Hrs.; 4 Credit Hrs.

23-17 U.S. to 1877

Winning of independence; problems of independence; rise of democracy, sectional struggle; Reconstruction. 4 Class Hrs.; 4 Credit Hrs.

23-18 U.S. since 1877

The great period of expansion; political, social and economic problems; reform and reaction in the twentieth century, and rise of United States to world power. 4 Class Hrs.; 4 Credit Hrs.

23-19 Latin America to 1826

American Indian and Spanish cultures and their fusing in the New World subsequent to Spanish conquest. The forces, both American and European, which gave rise to the Latin American wars of independence. 4 Class Hrs.; 4 Credit Hrs.

23-20 Latin America since 1826

Rise of great nations of Latin America; Caudillism; struggles toward democracy. Particular emphasis on relations between the U.S. and Latin America. 4 Class Hrs.; 4 Credit Hrs.

23-21 History of Mexico

Background of modern Mexico, emphasis on events since the Mexican Revolution of 1910 and on relations with the United States. 4 Class Hrs.; 2 Credit Hrs.

23-22 The Early Middle Ages

Europe from the decline of the Roman Empire through the early years of the thirteenth century. The classical heritage of the Middle Ages, development of Christianity and growth of the Medieval Church; rise of trade, commerce and towns; emergence of universities in Western Europe. 4 Class Hrs.; 4 Credit Hrs.

23-23 The Renaissance and Reformation

History of Europe from the thirteenth to the seventeenth centuries. Decline of the church and rise of Protestant sects; Humanism and various aspects of the new learning; development of the nation states; growth of international trade and capitalism; the Turkish threat to the West. 4 Class Hrs.; 4 Credit Hrs.

23-24 Russia from Peter the Great to 1917

Emergence of Russia as a recognized European power. Westernization and expansion of the Eighteenth century, merging into the Napoleonic Era and age of reaction. Reform, its failure, and the attendant revolutionary movements leading into the twentieth century and the last of the Romanovs. Social, economic and intellectual factors. 4 Class Hrs.; 4 Credit Hrs.

23-25 Eastern Civilization to 1000 A.D.

Origin and growth of civilization in India, Iran, China, and Japan to 1000 A.D. Basic religious and philosophical ideas which helped to mold social patterns, political institutions, and creative literature and art. 4 Class Hrs.; 4 Credit Hrs.

23-26 Eastern Civilization since 1000 A.D.

Impact of Islam upon Iran and India; Mongol and Turkish conquests; decline of Asiatic power resulting from European explorations and imperialism; Culture conflict between Eastern and Western civilizations. 4 Class Hrs.; 4 Credit Hrs.

23-28 History of Primitive Religion

Theories concerning the origin of religion in the light of anthropological studies into the religious beliefs and practices of selected primitive societies in Australasia, Africa, Asia, the Arctic, and the Americas. 4 Class Hrs.; 4 Credit Hrs.

23-29 History of State Religions of Antiquity

Earliest historical religious growth beyond the primitive whereby state governments undertook, through religious rites, to insure the welfare of citizenries. 4 Class Hrs.; 4 Credit Hrs.

23-32 American Colonial History to 1763

European background. The foundation and development of American institutions, ideas, and mores. The evolution of a distinct American character. 4 Class Hrs.; 4 Credit Hrs.

23-33 The Westward Movement

Motivations and personnel of the westward movement; part played by the movement in the ideological, economic, and cultural shaping of the nation. 4 Class Hrs.; 4 Credit Hrs.

23-34 Progressivism, War, and Reaction

American people in sharply contrasting moods in one generation. From imperialism to isolationism, from liberalism to reaction. 4 Class Hrs.; 4 Credit Hrs.

23-35 The New Deal, World War II and Its Aftermath

From isolationism to world leadership. New Deal to return of conservatives. 4 Class Hrs.; 4 Credit Hrs.

Evening Offerings in History

H 1-2 . History of Civilization

H 3-4 History of Civilization

H 9 The U.S. to 1865

H 10 The U.S. since 1865

H 11 Recent American History

H 13 English Constitutional History

H 14 American Constitutional History

H 16 Social and Cultural History of the U.S.

H 17 Economic History of the U.S.

H 19-20 English History

H 21 European History, 1815-1914

H 22 Recent European History

H 23-24 Russia since 1917

H 27 Modern India

H 28 Modern China and Japan

H 29 Contemporary Latin America

H 31 Contemporary Africa

H 32 The Middle East since 1920

H 35-36 History of Russia to 1917

(For course descriptions see separate Evening Session Bulletin of the College of Liberal Arts)

Philosophy and Religion**24-01 Introduction to Philosophy**

What philosophy is, its relation to other subjects, its uniqueness, its chief fields, its systems and schools of thought, its essential problems, its proposed solutions to man's quest for truth and meaning in life. 4 Class Hrs.; 4 Credit Hrs.

24-02 Problems of Philosophy

Is reality mental or physical, or both - or even more than mind and matter?

How do we know that we know? What are values and what values are most important? What determines our destiny and how free are we? What do philosophers think about God and immortality? Prep. 24-01; 4 Class Hrs.; 4 Credit Hrs.

24-03 History of Philosophy

Greek philosophers just before Plato's time. Ideas of Socrates, Plato, and Aristotle among the Greeks. Neo-Platonic, patristic, and scholastic periods. 4 Class Hrs.; 4 Credit Hrs.

24-04 History of Philosophy

Natural science era, emphasis upon Francis Bacon and Descartes. The Enlightenment, dealing especially with Locke and Berkeley. The idealistic period beginning with Kant. Prep. 24-03; 4 Class Hrs.; 4 Credit Hrs.

24-06 Introduction to Logic

Formal principles of correct and incorrect argument, meaning and significance of language, and the fundamental principles of scientific methods. Practical exercises in effective argument, correct procedures of inference, and clearer verbalization. 4 Class Hrs.; 4 Credit Hrs.

24-10 Social Philosophy

Influential conceptions as to character, structure, and function of society. Principles, means, and goals which underlie these major conceptions. Emphasis on Plato, Aristotle, Hobbes, Locke, Rousseau, and Marx. 4 Class Hrs.; 4 Credit Hrs.

24-11 Twentieth-Century Philosophy

Important trends in philosophical thought in the last sixty years. Emphasis on Bergson, Whitehead, Heidegger, Dewey, and Ayer. Prep. 24-04; 4 Class Hrs.; 4 Credit Hrs.

24-13 Ethics

Nature and importance of ethics. Its relation to philosophy, psychology, sociology, and religion. Origins of morality. Views of human nature. Standards for morality: authoritarianism, naturalism, intuitionism, formalism, hedonism, relativism, and self-realization. Ethics in business and the professions. 4 Class Hrs.; 4 Credit Hrs.

24-14 Ethics

Continuation of 24-13. 4 Class Hrs.; 4 Credit Hrs.

24-16 Philosophy of Science

Ideals, presuppositions, methods, and values which various writers have thought characteristic of science. Relations between science and philosophy. What logicians and metaphysicians have had to say about science and scientific method. 4 Class Hrs.; 4 Credit Hrs.

24-40 Elements of Philosophy

Nature and spirit of philosophy. Its relation to science, literature, and religion. Main systems and the great ideas among philosophers. How philosophy applies to daily experience and its suggested answers to the perennial questions encountered by the thinking person. 3 Class Hrs.; 3 Credit Hrs.

24-41 Problems of Philosophy

Continues the principal questions raised in 24-01. Attention to problems in the philosophy of religion and the relationships between the great religions of the world. Prep. 24-40; 3 Class Hrs.; 3 Credit Hrs.

24-42 Foundations in Ethics

Right and wrong, good and evil, obligation and mature moral responsibility. Nature of value judgments. Chief schools of ethical thought. Questions of freedom of choice, basic values, and recent trends. Prep. 24-41; 6 Class Hrs.; 3 Credit Hrs.

24-50 Introduction to Religion

The nature of religion. Its relation to myth, magic, science, philosophy, and theology. Varieties of religious experience. Tests for validity. Basic attributes of God or gods. Changing patterns in religious thought. 4 Class Hrs.; 4 Credit Hrs.

24-51 The Great Religions

Comparative study of beliefs and contributions of the great religions of the modern world. Emphasis on the Eastern religions. 4 Class Hrs.; 4 Credit Hrs.

24-52 The Religions of the United States

Judaeo-Christian beliefs and practices. Catholicism of both Western and Eastern rites, the three main branches of Judaism, and denominations within Protestantism. 4 Class Hrs.; 4 Credit Hrs.

24-53 Contemporary Trends in Religion

Trends toward unity as well as toward separatism. Effects of secularism and Communism. The conservative - liberal tensions. Religious reawakening. Influences of Eastern religions, especially Zen Buddhism. Indications of the role of religion in the future decade. 4 Class Hrs.; 4 Credit Hrs.

24-55 Philosophy of Religion

What is religion? What are the basic conceptions about God? What are the arguments proposed in favor of, as well as against, belief in deity? What about the problem of natural and moral evil? What about the various beliefs in immortality? What about a world religion? 4 Class Hrs.; 4 Credit Hrs.

Evening Offerings in Philosophy

Ph 1-2	Introduction to Philosophy
Ph 3	History of Ancient Philosophy
Ph 4	History of Modern Philosophy

Ph 5	Philosophy of Art
Ph 6	Philosophy of Religion
Ph 7	Principles of Social Ethics
Ph 8	Problems of Social Ethics
Ph 9-10	Logic
Ph 11-12	Social and Political Philosophy
Ph 13-14	Contemporary Philosophical Tendencies
(For course descriptions see separate Evening Session Bulletin of the College of Liberal Arts)	

Psychology

25-01 Introductory Psychology

Major concepts from most areas of psychological investigation. The experimental approach to the study of behavioral data including growth and development, learning, perception and motivation. 4 Class Hrs.; 4 Credit Hrs.

25-02 General Psychology

The sensory basis of response, individual and group differences, mental testing, attitude formation, and personal adjustment. Prep. 25-01; 4 Class Hrs.; 4 Credit Hrs.

25-04s Social Psychology

The relationship of man to the group; a study of his patterned social behavior, morale, customs and myths, institutions, and conscious and unconscious motives and motivation. Prep. 25-02; 5 Class Hrs.; 2 1/2 Credit Hrs.

25-06s Psychology of Adjustment

A beginning course devoted to problems and principles of adjustment to life. 5 Class Hrs.; 2 1/2 Credit Hrs.

25-07 Psychology

The wide and varied interests, efforts, pursuits and problems of psychology and psychologists. Growth and development, motivation, individual differences, measurement, statistical concepts, psychology of sensation and perception. 6 Class Hrs.; 3 Credit Hrs.

25-08 Psychology

The psychology of group behavior, personality development and integration. Prep. 25-07; 6 Class Hrs.; 3 Credit Hrs.

25-09 Statistics in Psychology

Scales of measurement, graphs, measures of central tendency and variability, and correlation. Prep. 25-02; 4 Class Hrs.; 4 Credit Hrs.

25-10 Statistics in Psychology

Probability, binomial and normal distributions, estimation, and parametric and onon-parametric tests of significance, including chi square, t-test, F test,

sign test, median test, simple analysis of variance. Prep. 25-09; 4 Class Hrs.; 4 Credit Hrs.

25-11 Individual Differences

Scientific principles basic to the investigation of human differences. History of the field, techniques which have evolved, and the bearing which this field has upon special disciplines within psychology. Prep. 25-02; 4 Class Hrs.; 4 Credit Hrs.

25-12 Experimental Psychology

Methods and techniques for investigating conditions of learning. Learning as a function of motive-incentive conditions, age, sex, kind of material, amount of material, and the mode of attack. These factors are considered in the light of current learning theory. Prep. 25-02; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

25-13 Experimental Psychology

Attention, the nature of illusions, perception of form, color, and space, and reading as a problem in perception. Prep. 25-02; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

25-14 Experimental Psychology

Structure and function of sense organs. Methods of investigating the sensory processes of vision, hearing, olfaction, taste, and the skin senses. Prep. 25-02; 3 Class Hrs.; 3 Lab. Hrs.; 4 Credit Hrs.

25-17 Measurements

Theory, selection, administration, scoring, and interpretation of individual intelligence tests. Training in the Wechsler-Bellevue Scale, the Stanford-Binet, and various developmental scales. Prep. 25-09; 4 Class Hrs.; 4 Credit Hrs.

25-18 Measurements

Workshop course in personality evaluation by psychometric means. Clinical approach to the study of the individual personality. Prep. 25-09; 4 Class Hrs.; 4 Credit Hrs.

25-19 Measurements

Workshop course in aptitude testing. Objective evaluative instruments and standardized testing procedures in industry. Prep. 25-02; 4 Class Hrs.; 4 Credit Hrs.

25-20 Measurements

Intensive practice under supervision with the Wechsler-Bellevue and the Binet and their alternate forms. Group tests of intelligence and other evaluative psychological instruments and techniques. Prep. 25-17; 4 Class Hrs.; 4 Credit Hrs.

25-29 Psychology of Personality

Systematic study of normal personality growth. Review of the physical, mental, and emotional development of the individual and of the social influences upon him. Prep. 25-02; 4 Class Hrs.; 4 Credit Hrs.

25-31 Abnormal Psychology

Study of personality deviants. Development of theories of abnormal behavior and their classification; rise of institutional care of the mentally ill; beginnings of humanitarian concepts of deviancy. Prep. 2 yrs. of psychology; 4 Class Hrs.; 4 Credit Hrs.

25-32 Abnormal Psychology

Systematic exploration of concepts of normality and abnormality. The etiology and dynamics of the various patterns of psychological disturbances. Relationship between psychological disturbances and the socio-cultural order. Prep. 25-31; 4 Class Hrs.; 4 Credit Hrs.

25-33 Social Psychology

Psychological principles underlying human relations with emphasis upon motivation, nature and development of groups, social movements and institutions, antisocial behavior, social controls, leadership, co-operation, war, propaganda, and prejudice. Prep. 25-02; 4 Class Hrs.; 4 Credit Hrs.

25-34 Child Psychology

Growth and development of infants and young children, their characteristic patterns of behavior, motivations, and needs. Prep. 25-02; 4 Class Hrs.; 4 Credit Hrs.

25-35 Industrial Psychology

Selection and placement of employees, use of psychological tests in industry, interviewing, job analysis, time and motion study, rating methods and training of employees. Prep. 25-02; 3 Class Hrs.; 3 Credit Hrs.

25-36 Industrial Psychology

Leadership, role-playing, group decision methods, optimal working conditions, industrial morale, and employee counseling. Prep. 25-02; 3 Class Hrs.; 3 Credit Hrs.

25-37 Adolescent Psychology

Developing patterns of behavior in later childhood and adolescence, and their implications for adult life. Interrelationship of the adolescent with his parents, his peer groups, and with various institutions of society. Prep. 25-34; 4 Class Hrs.; 4 Credit Hrs.

25-38 Physiological Psychology

Pertinent physiological fact and theory oriented to 'the relation of neuro-anatomy and psychology. (Permission of the instructor required.) 4 Class Hrs.; 4 Credit Hrs.

25-39 Physiological Psychology

The integrative action of the central nervous system and the problem of variability of behavior. Prep. 25-38; 4 Class Hrs.; 4 Credit Hrs.

25-41 Advanced Psychology

Current status of psychology among the sciences in the light of its history. Prep. 2 yrs. of psychology; 4 Class Hrs.; 4 Credit Hrs.

25-42 Advanced Psychology

Major schools of psychology which have influenced the development of modern psychology. Contemporary systematic trends and their historical development. Prep. 25-41; 4 Class Hrs.; 4 Credit Hrs.

25-50 Reading Improvement

Designed to assist students who wish to improve their study and reading habits. 3-5 Class Hrs.; 0 Credit Hrs.

25-61, 25-62 Directed Study

Independent study under the direction of a member of the department. Credit to be arranged.

25-71, 25-72, 25-73, 25-74 Seminar in Psychology

Discussion of current problems in psychology. 2 Class Hrs.; 1 Credit Hr. each course.

Evening Offerings in Psychology

Ps 1-2	General Psychology
Ps 3	Psychology of Personality
Ps 5	Abnormal Psychology
Ps 7	Child Psychology
Ps 8	Adolescent Psychology
Ps 9	Social Psychology
Ps 11	Developmental Psychology
Ps 17-18	Current Theories of Mind, Body, and Personality (For course descriptions see separate Evening Session Bulletin of the College of Liberal Arts)

Sociology

26-01 Principles of Sociology

Man's place in nature, his biological development from proto-human forms, the nature and meaning of racial differences, the emergence and growth of culture, and the comparison of cultural patterns in contemporary world society. Basic concepts of anthropology. 4 Class Hrs.; 4 Credit Hrs.

26-02 Principles of Sociology

The basis of human society, the process of individual adjustment to society and the matter of numbers, spatial distribution and organization of people. Social institutions, with emphasis on a structural, functional analysis of institutional life. Prep. 26-01; 4 Class Hrs.; 4 Credit Hrs.

26-07 Social Problems

A survey for students taking only one course in sociology. Problems of crime, racial and religious prejudice and discrimination, the physically handicapped, the family, political deviations, and natural resources. 4 Class Hrs.; 4 Credit Hrs.

26-08 Comparative Culture

The ways people have developed different learned modes of adjustment to universal human situations. Anthropological material from a wide variety of cultures. 4 Class Hrs.; 4 Credit Hrs.

26-09 American Culture

American culture and its major social institutions: economic, religious, governmental, familial, educational, welfare, and recreational. Social classes and stratification, mobility, and individualism. Prep. 26-02; 4 Class Hrs.; 4 Credit Hrs.

26-10 American Inter-Group Relations

Analysis of American society and culture from the point of view of nationality and racial groups within the United States, tracing their history, development, and probable future as well as their influence on national life and their place in the world today. Prep. 26-02; 4 Class Hrs.; 4 Credit Hrs.

26-11 Social Problems

Elements, processes, structures, and relationships involved in social problems and consequent public reactions. Natural resources, physical and mental health problems, alcoholism, and poverty. Prep. 26-02; 4 Class Hrs.; 4 Credit Hrs.

26-12 The Individual and Society

Life-history studies in the adjustment of the individual to society, dealing basically with constitutional, social, and cultural factors affecting personality development. Prep. 26-02; 4 Class Hrs.; 4 Credit Hrs.

26-15 Sociology of the Family

The family as a social institution in several selected cultures. Interrelations of the family and political, economic, and educational interests. Prep. 26-02; 4 Class Hrs.; 4 Credit Hrs.

26-16 Criminology

Patterns and evolution of criminal behavior, the social forces involved, and development of the individual criminal. Administration of criminal justice: law, courts, police, prisons. Prep. 26-02; 4 Class Hrs.; 4 Credit Hrs.

26-17 Urban Sociology

The modern American city based on its historical background and comparison with other cities of the world; its types, social values, and pathological elements; methods of city planning. Prep. 26-02; 4 Class Hrs.; 4 Credit Hrs.

26-18 Race and Culture Contact

Problems in areas of the world outside the United States, with emphasis

on Latin America and present and previous colonial areas of Africa and Asia; an analysis of the cleavages in the various countries studied and the processes of assimilation. Prep. 26-02; 4 Class Hrs.; 4 Credit Hrs.

26-19 Sociological Theory

History of sociological thought from its beginning to the early part of the nineteenth century. Origins, aims, and accomplishments of the social science movement. Prep. 26-12; 4 Class Hrs.; 4 Credit Hrs.

26-20 Sociological Theory

Influential theorists of the early nineteenth century. Modern and contemporary sociological theories. Contributions of Spencer, Marx, Sumner, Ward, Gumplovicz, Durkheim, Pareto, and Thomas. Prep. 26-19; 4 Class Hrs.; 4 Credit Hrs.

26-21 Sociology of Religion

The bearing of religion upon the total social structure. Socio-cultural backgrounds, motivations of religious belief and behavior, interactions of social status, and the social psychology of religion. Prep. 26-02; 4 Class Hrs.; 4 Credit Hrs.

26-22 Principles of Social Work

Various types of work and fields of specialization. Representatives from local agencies give occasional lectures. Prep. 26-12; 4 Class Hrs.; 4 Credit Hrs.

26-23 Methods and Problems in Social Research

Study of the theory and methods of social research with discussion of recent investigations and analysis of the methods used. 4 Class Hrs.; 4 Credit Hrs.

26-24 Community Organization and Analysis

The concept of community in relation to physical environment, membership population, and social institutions. Structure and function of communities and their component parts. Relations between communities and such broader entities as regions, political units, bureaucratic structures. 4 Class Hrs.; 4 Credit Hrs.

26-61, 26-62 Directed Study

Independent work under the direction of members of the department upon a chosen topic. Limited to qualified seniors preparing in Sociology with approval of department. 4 Credit Hrs. each course.

26-71 Seminar

Contemporary sociological theory with special emphasis given each term to a selected school of thought. 2 Class Hrs.; 2 Credit Hrs.

26-72 Seminar

Study of the causative factors of tensions between ethnic and religious groups in contemporary American society. Presupposes adequate knowledge of pertinent principles of social psychology. Several existing programs for constructive action are evaluated. 2 Class Hrs.; 2 Credit Hrs.

Evening Offerings in Sociology

- S 1-2 Principles of Sociology
 - S 3 Social Problems
 - S 4 Social Disorganization
 - S 5-6 General Anthropology
 - S 7 Cultural Anthropology
 - S 9-10 American Culture
 - S 13-14 Juvenile Delinquency
 - S 15-16 Criminology
 - S 17-18 Social Service
 - S 21 Preparation for Marriage
 - S 22 The Family
 - S 23 Race Relations and Cultural Contact
 - S 24 Urban Society
 - S 25 Social Control
 - S 26 The Aging in American Society
 - S 30-31 Social Theory
- (For course descriptions see separate Evening Session Bulletin of the College of Liberal Arts)

Art

27-01 Ancient Art

Materials and techniques employed by ancient artisans in architecture, sculpture, and painting. A survey of prehistoric art and the arts of ancient Egypt, Mesopotamia, Crete, and Greece. 4 Class Hrs.; 4 Credit Hrs.

27-02 Early Christian and Medieval Art

Roman, Early Christian, Byzantine, Romanesque and Gothic art. 4 Class Hrs.; 4 Credit Hrs.

27-03 Italian Renaissance Art

Renaissance architecture, sculpture, and painting. 4 Class Hrs.; 4 Credit Hrs.

27-04 European Art

The Baroque period of art and the European Renaissance period. Architecture, sculpture, painting, and the graphic arts up to the end of the nineteenth century. 4 Class Hrs.; 4 Credit Hrs.

27-08 American Art I

Development of American architecture, sculpture, and painting, from Colonial times to about 1860. 4 Class Hrs.; 4 Credit Hrs.

27-09 American Art II

American architecture, sculpture, and painting 1860 to the present. 4 Class Hrs.; 4 Credit Hrs.

27-21 Foundations of Western Culture

The early world and ancient man; the ancient civilizations of Mesopotamia, Egypt, Palestine, Crete, Greece, and Rome. 4 Class Hrs.; 4 Credit Hrs.

27-22 Foundations of Western Culture

Early Christian and Byzantine periods, the Moslem World, European feudalism, and Medieval religion, science, and the arts. Prep. 27-21; 4 Class Hrs.; 4 Credit Hrs.

27-23 Foundations of Western Culture

Medieval towns and guilds, the Renaissance, exploration and discovery, European religious conflicts, and Medieval arts and sciences. Prep. 27-22; 4 Class Hrs.; 4 Credit Hrs.

27-24 Foundations of Western Culture

American culture—our English heritage, Colonial New England, and the development of American culture to the nineteenth century. Prep. 27-23; 5 Class Hrs.; 2-1/2 Credit Hrs.

27-30 Elementary Drawing and Lettering

Elementary mechanical drawing problems, Gothic, Roman, and Script lettering, and tracings in ink. 2 Class Hrs.; 4 Lab. Hrs.; 4 Credit Hrs.

27-31 Pictorial Drawing

Isometric, oblique, and cabinet drawings, mechanical perspective, and industrial production illustration. Prep. 27-30; 2 Class Hrs.; 4 Lab. Hrs.; 4 Credit Hrs.

27-32 Creative Drawing

The student will execute creative drawing problems in pen and ink, pencil, charcoal, crayon, and chalk, that will offer experience in drawing form and texture. Solution of problems in black and white for commercial design. 6 Lab. Hrs.; 4 Credit Hrs.

27-33 Theory of Color and Design I

Techniques and theories of design and composition in commercial art and creative painting. Students will execute color compositions in water color and chalk. 6 Lab. Hrs.; 4 Credit Hrs.

27-34 Theory of Color and Design II

Problems in landscape and still life painting, costume/figure composition, and illustration, including book jacket design and portraiture. Prep. 27-33; 6 Lab. Hrs.; 4 Credit Hrs.

27-40 Ancient Art and Architecture

Prehistoric art and the art and architecture of Egypt, Mesopotamia, Crete, Greece, Rome, Early Christian times and the Byzantine period. 3 Class Hrs.; 3 Credit Hrs.

27-41 Medieval and Renaissance Art and Architecture

Christian symbolism; Romanesque and Gothic art with particular emphasis upon architecture and sculpture. 3 Class Hrs.; 3 Credit Hrs.

27-42 Renaissance and Modern Art and Architecture

Renaissance painting and the architectural developments in Europe and America from the Baroque period to contemporary times. 6 Class Hrs.; 3 Credit Hrs.

Evening Offerings in Art

- F 1 Introduction to the Arts
- F 2 History of Ancient Art
- F 3 History of Medieval Art
- F 4 Art Appreciation
- F 5 Italian Renaissance Art
- F 6 European Art
- F 7-8 History of American Art
- F 9 Modern Painting

(For course descriptions see separate Evening Session Bulletin of the College of Liberal Arts)

Music**28-01 Music Appreciation**

Representative works from the standard repertory are analyzed with emphasis on listening to music creatively. 4 Class Hrs.; 4 Credit Hrs.

28-03 Music Fundamentals

Basic facts concerning tone relationships, music notation, and elementary chord structure. 4 Class Hrs.; 4 Credit Hrs.

28-04 Musical Forms

Common musical forms such as the sonata, theme and variations, and rondo. Emphasis on hearing the formal structure of the composition. Prep. 28-01; 4 Class Hrs.; 4 Credit Hrs.

28-05 The Classical Symphony

Structural development of the symphonic form during the classical period. Significant symphonies of Haydn, Mozart, and Beethoven. Prep. 28-01, 28-03; 4 Class Hrs.; 4 Credit Hrs.

28-07 Introduction to Opera

Survey of important opera scores from Don Giovanni to the present. 4 Class Hrs.; 4 Credit Hrs.

28-12 Music Masterpieces before 1750

Important musical developments from the plain chant era through the Baroque. Recordings of various works from individual scores. 5 Class Hrs.; 2-1/2 Credit Hrs.

28-14 Music in the Romantic Era

Representative score by such composers as Schubert, Schumann, Berlioz, Chopin, and Wagner are analyzed to follow the development of the Romantic Movement in music. 4 Class Hrs.; 4 Credit Hrs.

28-15 Chamber Music

From duets to octets, from Mozart to Milhaud, this survey will cover scores of some of the most intensive and serious creations in the mainstream of Western Music. Prep. 28-01; 4 Class Hrs.; 4 Credit Hrs.

28-20 American Music

The development and emergence of an "American" school in composition. Prep. 28-01; 4 Class Hrs.; 4 Credit Hrs.

28-40 Introduction to Music

Major and minor scales and basic chord relationships; melody, harmony, counterpoint, and rhythm. A short history of music to 1300. 3 Class Hrs.; 3 Credit Hrs.

28-41 Musical Forms

The fugue, the sonata, theme and variations, and the lied. Analysis of the symphony, the string quartet, the opera, and the tone poem. 3 Class Hrs.; 3 Credit Hrs.

28-42 Contemporary Music

Special styles of composition such as the 12-tone technique, the neo-classic, the neo-romantic, and the impressionistic. 6 Class Hrs.; 3 Credit Hrs.

Speech and Drama

29-01 Public Speaking

Study and practice of basic principles and techniques of effective modern speaking. Emphasis on conversational delivery and clear, concise composition through group procedures, impromptu speaking, and the handling of short expository forms. 3 Class Hrs.; 3 Credit Hrs.

29-02 Public Speaking

Speech patterns which involve effective discussion; analysis, evidence, and reasoning as factors in convincing and persuading people. Prep. 29-01; 3 Class Hrs.; 3 Credit Hrs.

29-03 Effective Speaking

Fundamentals of speaking, conferring, and reporting. The class is organized as a functional group with officers and agenda. 6 Class Hrs.; 3 Credit Hrs. (5-week term); 3 Class Hrs.; 3 Credit Hrs. (10-week term).

29-11 Comparative Drama

Development of the theatre and the drama of Greece and Rome, medieval Europe, Elizabethan and Restoration England, and seventeenth-century France. 4 Class Hrs.; 4 Credit Hrs.

29-12 Comparative Drama

Development of European and American Theatre of the eighteenth, nineteenth and twentieth centuries. Growth and development of the proscenium theatre, the emphasis upon naturalistic and realistic presentation, and the theatre innovations. 4 Class Hrs.; 4 Credit Hrs.

29-17 An Introduction to the Theatre Arts

Aesthetics of the theatre. Nature and functions of dramatic composition and presentation. 4 Class Hrs.; 4 Credit Hrs.

29-18 Drama Criticism

Dramatic criticism from Aristotle to the present. Growth and development of the drama as seen through the criticism of plays and presentations. 4 Class Hrs.; 4 Credit Hrs.

29-21 Play Production

Principles which underlie theatre practice and theatre technique—selecting the play; analyzing the script; determining the style of production; designing the floor plan and the setting; planning the stage movement; designing the properties, the costumes, the make-up, the lighting; co-ordinating the work of the production staff; planning the budget. 4 Class Hrs.; 4 Credit Hrs.

29-22 Rehearsal and Performance

Mounting a play for production. The function of the director, the director's relationship with his associates, the conduct of rehearsals, the purpose and methods of acting, and the conduct and evaluation of performance. Prep. 29-21; 4 Class Hrs.; 4 Credit Hrs.

English

30-01 English

A review of basic sentence structure, punctuation, and principles of paragraphing. Theme assignments develop skill in the expository forms. 3 Class Hrs.; 3 Credit Hrs.

30-02 English

Structure, organization, and preparation of student reports; experimental work by theme assignments. Prep. 30-01; 3 Class Hrs.; 3 Credit Hrs.

30-03 English

Problems peculiar to description and narration. Theme work also includes the writing of business letters and a literary critique. Prep. 30-02; 3 Class Hrs.; 3 Credit Hrs.

30-04 Introduction to Literature

Aims and techniques of types of literature: the play, the short story, and lyrical and narrative poetry. The writing of short, critical reports. 5 Class Hrs.; 2-1/2 Credit Hrs.

30-15 Literature

Five Shakespearean plays are read and discussed with special attention to character, motivation, situation, and adaptation to the Elizabethan stage. 3 Class Hrs.; 3 Credit Hrs.

30-16 American Literature

Outstanding works in American literature in their relation to social and intellectual backgrounds. 6 Class Hrs.; 3 Credit Hrs.

30-19 Shakespeare Plays

Five plays not included in 30-15, 30-61 or 30-62 are studied and discussed with emphasis on character, story, and significance to modern readers. 5 Class Hrs.; 2-1/2 Credit Hrs.

30-21 Intermediate Writing

Writing of the shorter forms of composition. Student manuscripts are read and analyzed. 4 Class Hrs.; 4 Credit Hrs.

30-22 Intermediate Writing

Preliminary analysis and completion of a short story on a given conflict problem. Prep. 30-21; 4 Class Hrs.; 4 Credit Hrs.

30-23 Advanced Composition

For advanced students interested in literary composition and with proven ability in 30-22. 4 Class Hrs.; 4 Credit Hrs.

30-24 Advanced Composition

Preparation of manuscripts for publication. 4 Class Hrs.; 4 Credit Hrs.

30-29 Foundations of the English Language

Development of English out of and alongside other languages. Some principles of linguistic science. 4 Class Hrs.; 4 Credit Hrs.

30-30 Foundations of the English Language

Influence of accent. English in its larger elements, informative and symbolic uses of it, with some of the implications of semantics. Prep. 30-29; 4 Class Hrs.; 4 Credit Hrs.

30-31 Western World Literature

Principal writings of the classic period, including the principal Greek and Latin authors from Homer to Lucian, and passages from the Bible. 4 Class Hrs.; 4 Credit Hrs.

30-32 Western World Literature

Literary masterpieces of England, France, Germany, Norway, Spain, Italy, and Russia. 4 Class Hrs.; 4 Credit Hrs.

30-33 Survey of English Literature

Broad survey of English literature to 1800 intended to give the student an appreciation of English literature. 4 Class Hrs.; 4 Credit Hrs.

30-34 Survey of English Literature

Survey of English literature from 1800 to the present century. The writers who contributed most to the development of modern literature in England. 4 Class Hrs.; 4 Credit Hrs.

30-35 American Literature to 1860

American literature from colonial times to the triumph of the transcendental movement in New England. 4 Class Hrs.; 4 Credit Hrs.

30-36 American Literature after 1860

Rise of realism after the Civil War; development of American humor; appearance of local color writers; modern trends since 1900. Prep. 30-35; 4 Class Hrs.; 4 Credit Hrs.

30-37 Nineteenth Century Poetry

The poetry of Wordsworth, Coleridge, Shelley, Keats, and Byron against the background of romanticism. Their poetic theories and practices. 4 Class Hrs.; 4 Credit Hrs.

30-38 Nineteenth Century Poetry

Victorian poets, especially Tennyson and Browning, and their significance in the development of poetry. 4 Class Hrs.; 4 Credit Hrs.

30-40 Classical and Biblical Literature

Standard works of antiquity, chiefly those which continue today in popular favor. Works assigned will be examined as to meaning, tone, and historical context. 3 Class Hrs.; 3 Credit Hrs.

30-41 European Literature

Five or six European works of lasting importance, affording a variety of literary types, historical periods, and national origins. 3 Class Hrs.; 3 Credit Hrs.

30-42 Masterpieces of England and America

Selected lengthy works of Fielding, Howells, and Thomas Huxley; five modern American plays. 6 Class Hrs.; 3 Credit Hrs.

30-43 Nineteenth Century Prose

Significant prose writers of the early nineteenth century in England and their relation to the social, political, and literary currents of the time. 4 Class Hrs.; 4 Credit Hrs.

30-44 Nineteenth Century Prose

Major prose writers of Victorian England; Thackeray, Newman, Ruskin, Arnold, Huxley, Pater, and Stevenson. 4 Class Hrs.; 4 Credit Hrs.

30-45 Great English Novels of the Nineteenth Century

Representative works of Scott, Jane Austen, Emily Brontë, Dickens, and Thackeray. 4 Class Hrs.; 4 Credit Hrs.

30-46 Great English Novels of the Nineteenth Century

Representative works of George Eliot, Meredith, Hardy, Trollope, and Conrad. 4 Class Hrs.; 4 Credit Hrs.

30-47 The Modern Novel

Outstanding novels of the twentieth century, with emphasis on the social outlook they imply. 4 Class Hrs.; 4 Credit Hrs.

30-48 The Modern Drama

Native and European drama since 1900, with emphasis on the relationship between drama and history in the twentieth century. 4 Class Hrs.; 4 Credit Hrs.

30-50 Representative Novels

Significant novels from the time of Richardson and Fielding to the present. 5 Class Hrs.; 2-1/2 Credit Hrs.

30-51 Introduction to Journalism

Functions of the editorial department and general tasks of an "inside" man. Extensive practice in the rewriting of news stories. 4 Class Hrs.; 4 Credit Hrs.

30-52 Introduction to Journalism

Problems of reporting and newswriting, with written assignments in all types of spot news reporting. Prep. 30-51; 4 Class Hrs.; 4 Credit Hrs.

30-53 Techniques of Journalism

Editing the news. Writing of editorials, feature articles, and columns. Prep. 30-52; 4 Class Hrs.; 4 Credit Hrs.

30-54 Techniques of Journalism

Continued practice in newspaper writing, the covering of special assignments, and editorial problems. Prep. 30-53; 4 Class Hrs.; 4 Credit Hrs.

30-55 Vocabulary Building

Greek, Latin, and Germanic elements from which modern English words are evolved. History of the language and types of semantic change. 3 Class Hrs.; 3 Credit Hrs.

30-57 Introduction to Semantics

Ways in which language habits affect thinking processes and raise problems in social relationships. 3 Class Hrs.; 3 Credit Hrs.

30-58 Introduction to Literary Criticism

Major schools of criticism through a study of Aristotle, Longinus, Sidney, Johnson and a representative group of moderns. 5 Class Hrs.; 2-1/2 Credit Hrs.

30-61 Shakespeare

The Elizabethan period, sixteenth century London, the Shakespearean stage and audience, and the actors' companies. Shakespeare's life and his development as a dramatist. Five plays intensively studied. 4 Class Hrs.; 4 Credit Hrs.

30-62 Shakespeare

Shakespeare's language, the text of the plays, Shakespearean criticism and editors' problems. Four plays and the sonnets intensively studied. Prep. 30-61; 4 Class Hrs.; 4 Credit Hrs.

30-63 Chaucer

The Canterbury Tales, with attention to Middle English vocabulary, historical setting, and the rhythms and devices of Chaucer's poetry. 4 Class Hrs.; 4 Credit Hrs.

30-64 Chaucer

Troilus and Criseyde, *The House of Fame*, *The Parliament of Fowls*, and certain selected parts of *Boece*. Prep. 30-63; 4 Class Hrs.; 4 Credit Hrs.

30-66 Eugene O'Neill

Development of Eugene O'Neill as a playwright and his influence in world drama as writer of tragedy, as naturalist, and as experimenter. 5 Class Hrs.; 2-1/2 Credit Hrs.

30-70 Eighteenth Century English Literature

Writings of Dryden, Pope, Swift, and Addison to develop a perspective on the Augustan world. 4 Class Hrs.; 4 Credit Hrs.

30-71 Eighteenth Century English Literature

Dr. Johnson, Boswell, Sterne, Gray, and Blake are the major figures dealt with. 4 Class Hrs.; 4 Credit Hrs.

30-72 Seventeenth Century English Literature

Major creative writings of the first half of the seventeenth century, including Bacon, Jonson, and Donne, but excluding the drama. 4 Credit Hrs.; 4 Class Hrs.

30-73 Seventeenth Century English Literature

Writings of Milton, Marvell, Butler, Bunyan and related figures. 4 Class Hrs.; 4 Credit Hrs.

30-80 Seminar in Journalism

The college newspaper and professional problems of procuring, presenting, and purveying news. Required of *News* editors. 2 Class Hrs.; 2 Credit Hrs.

30-82 Swift and his Circle

Major writings of Jonathan Swift, the themes and techniques of his satire, his times; related authors. 4 Class Hrs.; 4 Credit Hrs.

30-83 Johnson and his Circle

Major writings of Dr. Johnson, with incursions into related writers. 4 Class Hrs.; 4 Credit Hrs.

Evening Offerings in English

- E 1-2 English I & II
 - E 3 Introduction to Literature
 - E 4 Advanced Composition
 - E 8 The English Language
 - E 10-11 Effective Speaking
 - E 15-16 Introduction to Journalism
 - E 17-18 Techniques of Journalism
 - E 21-22 Western World Literature I
 - E 23-24 Western World Literature II
 - E 25-26 English Literature
 - E 26-27 American Literature
 - E 31-32 Chaucer
 - E 33-34 Shakespeare
 - E 35-36 Restoration and Eighteenth Century English Literature
 - E 37-38 Romantic Poets of the Nineteenth Century
 - E 39-40 The English Novel
 - E 41 English Drama
 - E 50 The American Novel
 - E 52 American Drama
 - E 53 Contemporary American Poetry
 - E 54 Modern American Novel
- (For course descriptions see separate Evening Sessions Bulletin of the College of Liberal Arts)

French

31-01 Elementary French

Essentials of grammar, practice in pronunciation, and progressive acquisition of a basic vocabulary and idiomatic expressions. 3 Class Hrs.; 3 Credit Hrs.

31-02 Elementary French

More difficult points of grammar, particularly uses of subjunctive mood. Prep. 31-01; 3 Class Hrs.; 3 Credit Hrs.

31-03 Elementary French

Reading of simple French prose, with written and oral exercises based on the material read. French conversation is encouraged. Prep. 31-02; 3 Class Hrs.; 3 Credit Hrs.

31-04 Elementary French

Reading of French prose of moderate difficulty; with practice in conversation. Prep. 31-03; 3 Class Hrs.; 1-1/2 Credit Hrs.

31-11 Introduction to French Literature

Intermediate course for freshmen who have had two or three years of high school French. A review of grammar with practice in composition and conversation. 3 Class Hrs.; 3 Credit Hrs.

31-12 Introduction to French Literature

History of French civilization with discussions and conversation. Prep. 31-11; 3 Class Hrs.; 3 Credit Hrs.

31-13 Introduction to French Literature

Intensive reading of modern prose with conversational practice. Prep. 31-12; 3 Class Hrs.; 3 Credit Hrs.

31-14 Introduction to French Literature

Reading and conversation. Prep. 31-13; 3 Class Hrs.; 1-1/2 Credit Hrs.

31-15 Intermediate French

French civilization through texts of average difficulty; review of grammar; written and oral exercises. Prep. 31-04; 4 Class Hrs.; 4 Credit Hrs.

31-16 Intermediate French

Reading of modern prose with conversational practice. Prep. 31-15; 4 Class Hrs.; 4 Credit Hrs.

31-17 French Composition and Conversation

Grammar review, written work and conversation. Prep. 31-16; 4 Class Hrs.; 4 Credit Hrs.

31-18 French Composition and Conversation

Free composition, oral reports and class discussion. Prep. 31-17; 4 Class Hrs.; 4 Credit Hrs.

31-19 Readings from Contemporary French

Selected passages from narrative and dramatic prose of the last fifty years. Among the writers included are Colette, Duhamel, Renard, Rolland, Vildrac, Anatole France, Gide, Proust, Romain, and Sartre. Prep. 31-16; 5 Class Hrs.; 2-1/2 Credit Hrs.

31-21 French Literature from 1850 to 1900

The novel, especially of Flaubert, Zola, Daudet, Loti, and Huysmans. Selections from Sainte-Beuve, Taine, and Renan. Prep. 31-16; 4 Class Hrs.; 4 Credit Hrs.

31-22 French Literature from 1850 to 1900

Lyric poetry of the Parnassian and Symbolist schools, with selections from Gautier, Banville, Leconte de Lisle, Hérédia, Sully-Prudhomme, Baudelaire, Verlaine, Mallarmé, and Rimbeau. Plays of the period are assigned for outside reading. Prep. 31-16; 4 Class Hrs.; 4 Credit Hrs.

31-23 French Classicism

Background and non-dramatic literature of the seventeenth century. Selections from Malherbe, Descartes, Pascal, La Fontaine, Mme. de Sévigné, Mme. de La Fayette, Bossuet, and Fénelon. Prep. 31-16; 4 Class Hrs.; 4 Credit Hrs.

31-24 French Classicism

Dramatic theories especially by Boileau. Plays of Corneille, Molière, and Racine. Prep. 31-16; 4 Class Hrs.; 4 Credit Hrs.

31-25 French Romanticism

Origins and development of the Romantic movement in France. Selected poems by Lamartine, Hugo, Musset, and Vigny. Characteristic Romantic prose. Prep. 31-16; 4 Class Hrs.; 4 Credit Hrs.

Dramatic theories expounded in the *Préface de Cromwell* and Romantic dramas. Prep. 31-16; 4 Class Hrs.; 4 Credit Hrs.

German

32-01 Elementary German

Essentials of grammar; practice in pronunciation; acquisition of a basic vocabulary and idiomatic expressions. 3 Class Hrs.; 3 Credit Hrs.

32-02 Elementary German

More difficult points of grammar, particularly uses of subjunctive mood. Prep. 32-01; 3 Class Hrs.; 3 Credit Hrs.

32-03 Elementary German

Reading of simple German prose, with oral and written exercises based on material read. German conversation is encouraged. Prep. 32-02; 3 Class Hrs.; 3 Credit Hrs.

32-04 Elementary German

Reading of German prose of moderate difficulty; conversation. Prep. 32-03; 3 Class Hrs.; 1 1/2 Credit Hrs.

32-15 Intermediate German

German civilization through texts of average difficulty. Review of grammar and written and oral exercises. Prep. 32-04; 4 Class Hrs.; 4 Credit Hrs.

32-16 Intermediate German

Reading of modern prose; conversational practice. Prep. 32-15; 4 Class Hrs.; 4 Credit Hrs.

32-17 German Composition and Conversation

Grammar review; written work; German conversation. Prep. 32-16; 4 Class Hrs.; 4 Credit Hrs.

32-18 German Composition and Conversation

Free composition; oral reports, class discussions. Prep. 32-17; 4 Class Hrs.; 4 Credit Hrs.

32-19 Scientific German

Reading of scientific German. Articles dealing with chemistry, physics, mathematics, and biology. Prep. 32-16; 5 Class Hrs.; 2 1/2 Credit Hrs.

32-21 Modern German Literature

Main currents of German literature since 1880. The novel and short story of leading authors. Prep. 32-16; 4 Class Hrs.; 4 Credit Hrs.

32-22 Modern German Literature

Drama and poetry. Representative selections from the Naturalistic, Impressionistic, and Expressionistic movements. Prep. 32-16; 4 Class Hrs.; 4 Credit Hrs.

32-23 The Classical Period of German Literature

Development of German literature during the second half of the eighteenth century, dealing especially with the works of Lessing and Schiller. Prep. 32-16; 4 Class Hrs.; 4 Credit Hrs.

32-24 The Classical Period of German Literature

Life and works of Goethe, with emphasis on his lyric and dramatic poetry. Prep. 32-16; 4 Class Hrs.; 4 Credit Hrs.

32-25 German Literature of the Nineteenth Century

Chief tendencies in German literature from the beginning of Romanticism to the coming of Naturalism. Representative prose works of principal writers. Prep. 32-16; 4 Class Hrs.; 4 Credit Hrs.

32-26 German Literature of the Nineteenth Century

Drama and poetry. Selections from Kleist, Hölderlin, Eichendorff, Novalis, Heine, and Hebbel. Prep. 32-16; 4 Class Hrs.; 4 Credit Hrs.

Spanish

33-01 Elementary Spanish

Essentials of grammar; practice in pronunciation; progressive acquisition of basic vocabulary and idiomatic expressions. 3 Class Hrs.; 3 Credit Hrs.

33-02 Elementary Spanish

More difficult points of grammar, particularly the uses of subjunctive mood. Prep. 33-01; 3 Class Hrs.; 3 Credit Hrs.

33-03 Elementary Spanish

Reading of simple Spanish prose, with written and oral exercises based on the material read. Spanish conversation is encouraged. Prep. 33-02; 3 Class Hrs.; 3 Credit Hrs.

33-04 Elementary Spanish

Reading of Spanish prose of moderate difficulty; conversation. Prep. 33-03; 3 Class Hrs.; 1 1/2 Credit Hrs.

33-15 Intermediate Spanish

Spanish civilization through texts of average difficulty; review of grammar; written and oral exercises. Prep. 33-04; 4 Class Hrs.; 4 Credit Hrs.

33-16 Intermediate Spanish

Reading of modern prose, with conversational practice. Prep. 33-15; 4 Class Hrs.; 4 Credit Hrs.

33-17 Spanish Composition and Conversation

Grammar review, written work, and conversation. Prep. 33-16; 4 Class Hrs.; 4 Credit Hrs.

33-18 Spanish Composition and Conversation

Free composition, oral reports, and class discussions. Prep. 33-17; 4 Class Hrs.; 4 Credit Hrs.

33-19 Readings from Contemporary Spanish

Selected passages from narrative and dramatic prose of the last fifty years. Among writers included are Unamuno, "Azorín," Benavente, Ibáñez, Baroja, Valle-Inclán, Ayala, and Ortega y Gasset. Prep. 33-16; 5 Class Hrs.; 2 1/2 Credit Hrs.

33-21 Spanish Literature of the Golden Age

Works of Cervantes, particularly *Don Quixote*. Prep. 33-16; 4 Class Hrs.; 4 Credit Hrs.

33-22 Spanish Literature of the Golden Age

Drama of Lope de Vega, Tirso de Molina, and Calderón. Prep. 33-16; 4 Class Hrs.; 4 Credit Hrs.

33-23 Spanish Literature of the Nineteenth Century

Literature of Spain during first half of nineteenth century, Romantic drama and poetry. Prep. 33-16; 4 Class Hrs.; 4 Credit Hrs.

33-24 Spanish Literature of the Nineteenth Century

Spanish literature of second half of nineteenth century, particularly the Realistic novel. Prep. 33-16; 4 Class Hrs.; 4 Credit Hrs.

33-25 Spanish American Literature

General trends of Spanish American literature, including the colonial period, the period of the struggle for independence, and the nineteenth century epic of the Gaucho and the Indian. Prep. 33-16; 4 Class Hrs.; 4 Credit Hrs.

33-26 Spanish American Literature

Better known Spanish American writers of the Modernistic, Realistic, and Contemporary periods, with emphasis on Rubén Darío and Gabriela Mistral. Prep. 33-16; 4 Class Hrs.; 4 Credit Hrs.

Russian

34-01 Elementary Russian

Essentials of grammar; practice in pronunciation; progressive acquisition of a basic vocabulary and idiomatic expressions. 5 Class Hrs.; 5 Credit Hrs.

34-02 Elementary Russian

More difficult points of grammar; additional vocabulary, reading of simple prose. 5 Class Hrs.; 5 Credit Hrs.

34-03 Intermediate Russian

Grammar review; written work; reading of prose of moderate difficulty. 5 Class Hrs.; 5 Credit Hrs.

34-04 Intermediate Russian

Reading of scientific prose. 5 Class Hrs.; 5 Credit Hrs.

Evening Offerings in Modern Languages

ML 1-2 Elementary French

ML 3-4 Intermediate French

ML 10-11 Elementary Spanish

ML 12-13 Intermediate Spanish

ML 20-21 Elementary German

ML 22-23 Intermediate German

ML 30-31 Elementary Russian

ML 32-33 Intermediate Russian

(For course descriptions see separate Evening Session Bulletin of the College of Liberal Arts)

Accounting

41-01 Principles of Accounting

Cycle of bookkeeping procedure and analysis of transactions. 2 Class Hrs.; 2 Lab. Hrs.; 3 Credit Hrs.

41-02 Principles of Accounting

Transaction analysis; special forms of the recording process. Prep. 41-01; 2 Class Hrs.; 2 Lab. Hrs.; 3 Credit Hrs.

41-03 Principles of Accounting

Accounting features peculiar to the individual proprietorship, the partnership, and the corporation. Prep. 41-02; 2 Class Hrs.; 2 Lab. Hrs.; 3 Credit Hrs.

41-10 Principles of Accounting

Covers the content of courses 41-01, 41-02, and 41-03. Intended for transfer students. 10 Class Hrs.; 10 Credit Hrs.

41-24 Managerial Accounting

Analytical and interpretive aspects of accounting as a managerial tool. 3 Class Hrs.; 3 Credit Hrs.

41-27 Accounting Statements

Preparation and analysis of basic accounting statements. Prep. 41-03; 3 Class Hrs.; 3 Credit Hrs.

41-31 Cost Accounting

Theory and techniques of accounting for the costs of manufactured products. Prep. 41-24; 3 Class Hrs.; 3 Credit Hrs.

41-32 Cost Accounting

Continuation of 41-31. Prep. 41-31; 3 Class Hrs.; 3 Credit Hrs.

41-33 Cost Accounting for Management

Basic cost accounting theory and practice. Use of cost data as a management tool. 10 Class Hrs.; 5 Credit Hrs.

41-34 Industrial Accounting

For industrial engineering students only. Foundation in basic accounting principles and procedures. 3 Class Hrs.; 3 Credit Hrs.

41-35 Industrial Accounting

For industrial engineering students only. Accounting theory and practice. Uses of accounting data as a management tool. Prep. 41-34; 5 Class Hrs.; 5 Credit Hrs.

41-37 Intermediate Accounting

Problems of valuation and presentation of corporate accounts. Prep. 41-24; 3 Class Hrs.; 3 Credit Hrs.

41-38 Intermediate Accounting

A continuation of 41-37. Prep. 41-37; 3 Class Hrs.; 3 Credit Hrs.

41-42 Budget Procedure

Basic principles and procedures of budget preparation. Prep. 41-33; 5 Class Hrs.; 2 1/2 Credit Hrs.

41-43 Auditing

Auditing principles and procedures. Prep. 41-38; 3 Class Hrs.; 3 Credit Hrs.

41-44 Auditing

Continues the work of 41-43. Prep. 41-43; 3 Class Hrs.; 3 Credit Hrs.

41-45 Advanced Accounting I

Accounting for partnership operations, special sales procedures, and actuarial science. Prep. 41-38; 3 Class Hrs.; 3 Credit Hrs.

41-47 Consolidated Statements

Accounting and economic problems involved in preparation of consolidated statements. Prep. 41-45; 3 Class Hrs.; 3 Credit Hrs.

41-55 Advanced Accounting II

Branch accounting; fiduciary, municipal, and institutional accounting. Prep. 41-47; 3 Class Hrs.; 3 Credit Hrs.

41-56 Role of Accounting in Decision-Making

Accounting as a tool for managerial analysis and control. 2 Class Hrs.; 2 Credit Hrs.

41-61 Accounting Seminar I

Evolution of accounting concepts and principles. General discussion and preparation of outline for paper to be presented in Course 41-62. 2 Class Hrs.; 2 Credit Hrs.

41-62 Accounting Seminar II

Discussion and presentation of research papers. Prep. 41-61; 2 Class Hrs.; 2 Credit Hrs.

Industrial Relations

42-52 Motion and Time Study

A survey course for students in the industrial relations curriculum. Motion and time study techniques. Work measurement techniques; micromotion. Emphasis on management and labor relations aspects. Laboratory demonstrations and projects. Prep. 45-35, 45-22; 1 Class Hr.; 2 Lab. Hrs.; 2 Credit Hrs.

42-61 Seminar in Collective Bargaining

Discussion of cases or reports on problems actually faced by industrial relations departments. Management authority, governmental regulation of labor-management relations, grievance procedures, and arbitration. Research by students. Prep. 20-26; 4 Class Hrs.; 4 Credit Hrs.

42-62 Seminar in Collective Bargaining

Discussion of cases or reports on problems faced by industrial relations departments dealing with employees through collective bargaining. Individual research. Prep. 20-26; 4 Class Hrs.; 4 Credit Hrs.

Marketing

43-23 Marketing I

Basic marketing functions, institutions, and policies. Emphasis on industrial and ultimate consumer analysis, product policy, channels of distribution, and pricing. 3 Class Hrs.; 3 Credit Hrs.

43-24 Marketing II

A continuation of 43-23 with emphasis placed on student recognition and handling of marketing problems. Topics such as: personal selling, advertising, marketing research, and integrated sales programs. 3 Class Hrs.; 3 Credit Hrs.

43-35 Marketing Management I

Analysis of marketing problems. Decision-making and managerial aspects of a marketing program. Case studies are utilized. Prep. 43-23, 43-24; 3 Class Hrs.; 3 Credit Hrs.

43-36 Marketing Management II

A continuation of 43-35. Particular emphasis on advertising management. 3 Class Hrs.; 3 Credit Hrs.

43-37 Sales Management

Organization of sales department, planning sales force activities, operation of sales force, and evaluation of results. Prep. 43-23, 43-24; 3 Class Hrs.; 3 Credit Hrs.

43-40 Advertising Production

Mechanical problems and processes in advertising. Major emphasis is on printed advertising. Includes study of production techniques in television and radio. Individual advertising projects are worked out. Prep. 43-23, 43-24; 3 Class Hrs.; 3 Credit Hrs.

43-42 Marketing Policy

Primarily a case-study course oriented to the analysis of problems in marketing strategy and policy. Prep. 43-23, 43-24; 3 Class Hrs.; 3 Credit Hrs.

43-43 Marketing Research I

The scientific method, research methodology and its validity. Influence of behavioral and social sciences in solution of marketing problems. Prep. 43-23, 43-24; 3 Class Hrs.; 3 Credit Hrs.

43-44 Foreign Marketing

Problems, policies, and techniques essential to effective sales in foreign markets. 2 Class Hrs.; 2 Credit Hrs.

43-45 Marketing Research II

Application of techniques and concepts of operations research, linear

programming, dynamic simulation, decision theory and information theory in marketing research. Prep. 43-43; 3 Class Hrs.; 3 Credit Hrs.

43-50 Industrial Marketing

Selected topics covering a variety of phases of industrial marketing are the bases for individual research, discussion and lecture. 2 Class Hrs.; 2 Credit Hrs.

43-52 Retail Merchandising

Analytical study of retailing. Managerial functions stressed. Cases and readings used. Prep. 43-23, 43-24; 3 Class Hrs.; 3 Credit Hrs.

43-60 Marketing Controls

Emphasizes the analytical selection of advertising media and use of accounting and statistical controls necessary for measurement of advertising and selling efforts. Prep. 43-42; 4 Class Hrs.; 4 Credit Hrs.

43-62 Seminar in Marketing Theory

Concepts of behavioral and social sciences applied in the synthesis and analysis of marketing matters. Prep. 43-23, 43-24; 4 Class Hrs.; 4 Credit Hrs.

Finance and Insurance

44-13 Construction Finance

Problems of business organization and finances applicable to engineering and construction projects. Public projects, private enterprise, and public utilities considered. 2 Class Hrs.; 2 Credit Hrs.

44-20 Introduction to Finance

Role of finance in the economic world. Survey of financial institutions and their functions. Capital formation. 3 Class Hrs.; 3 Credit Hrs.

44-22 Principles of Insurance

Basic principles of insurance and risk. Types of insurance; organizations in field of insurance. 3 Class Hrs.; 3 Credit Hrs.

44-31 Business Finance

Financial organization and management. Financial and legal implications of form of organization. Prep. 44-20; 4 Class Hrs.; 4 Credit Hrs.

44-32 Business Finance

Working capital, administration of income, financial valuation and principles applicable in cases of consolidation, merger, recapitalization, and bankruptcy. Prep. 44-31; 4 Class Hrs.; 4 Credit Hrs.

44-33 Life Insurance

Life insurance and its place in planning an estate; Policy provisions; rate determination; net cost of insurance; legal aspects of life insurance. Prep. 44-22; 3 Class Hrs.; 3 Credit Hrs.

44-34 Property and Casualty Insurance

Detailed study of property-casualty insurance contracts, rates, and financial management of insurer. Prep. 44-33; 3 Class Hrs.; 3 Credit Hrs.

44-35 Estate Planning and Taxation

Trust administration, wills, etc., from the viewpoint of estate planner. Prep. 44-22; 3 Class Hrs.; 3 Credit Hrs.

44-36 Estate Planning and Taxation

Emphasis upon tax implications in relation to financial decisions in business, life insurance, and estate planning. Prep. 44-35; 3 Class Hrs.; 3 Credit Hrs.

44-41 Investments

Methods of analyzing an industry, a particular company in the industry, and specific securities of the company. Protective covenants and remedies of security holders. Prep. 44-32; 3 Class Hrs.; 3 Credit Hrs.

44-42 Investments

Management of investment funds of an individual or an institution with consideration of fluctuations in business cycle and money conditions. Prep. 44-41; 3 Class Hrs.; 3 Credit Hrs.

44-52 Security Markets

Operation of security markets. Brokerage houses, commodity exchanges, government regulation, and problems of security pricing. Prep. 44-42; 3 Class Hrs.; 3 Credit Hrs.

44-61 Seminar in Finance and Insurance

Opportunity to pursue research work in specific aspects of this field. Oral reports, group discussion. Prep. 44-42; 4 Class Hrs.; 4 Credit Hrs.

44-62 Seminar in Finance and Insurance

Continuation of individual research and group discussions which began in 44-61. Prep. 44-61; 4 Class Hrs.; 4 Credit Hrs.

Business Management

45-21 Principles of Business Management

Operating policies and problems of business enterprise as they pertain to the use of men, machines, and money. 3 Class Hrs.; 3 Credit Hrs.

45-22 Principles of Business Management

A continuation of 45-21. Prep. 45-21; 3 Class Hrs.; 3 Credit Hrs.

45-35 Production Management

Analysis and discussion of production problems. Case studies used. Prep. 45-21, 45-22; 3 Class Hrs.; 3 Credit Hrs.

45-36 Personnel Management

Personnel policy and personnel administration as a tool of management. Timely, significant manpower problems in industry; case studies. Prep. 45-21, 45-22; 3 Class Hrs.; 3 Credit Hrs.

45-37 Personnel Management

A continuation of 45-36. Prep. 45-36; 3 Class Hrs.; 3 Credit Hrs.

45-52 Management of Sales

Organization and operation of the sales department. Case studies. 2 Class Hrs.; 2 Credit Hrs.

45-61 Seminar in Management

Analysis and appraisal of business problems. Readings and case studies used. 3 Class Hrs.; 3 Credit Hrs.

45-62 Seminar in Management

A continuation of 45-61; 4 Class Hrs.; 4 Credit Hrs.

Business Law

46-03 Contracts and Agency

Basic legal principles of contracts and agency applied to engineering practices. 3 Class Hrs.; 3 Credit Hrs.

46-41 Legal Aspects of Business

Law of Contracts and Agency. 3 Class Hrs.; 3 Credit Hrs.

46-42 Legal Aspects of Business

Law of negotiable instruments, suretyship and guaranty. 3 Class Hrs.; 3 Credit Hrs.

46-53 Basic Federal Taxes

Internal Revenue Code and Treasury Regulations. Taxation of individuals. 2 Class Hrs.; 2 Lab. Hrs.; 3 Credit Hrs.

46-54 Basic Federal Taxes

Taxation of partnerships, corporations, and fiduciaries. Policy-planning for tax economies. 2 Class Hrs.; 2 Lab. Hrs.; 3 Credit Hrs.

46-55 Labor Law

Changing judicial principles and statutory standards of employment and management-union relations since 1800. 3 Class Hrs.; 3 Credit Hrs.

46-56 Law of Merchandising

The law applicable to the sale of goods. Bailments. Prep. 46-42; 3 Class Hrs. 3 Credit Hrs.

46-57 Law of Corporation Finance and Insurance

Legal aspects of the various forms of business organization. Principles of insurance law and examination of typical policy contracts. Prep. 46-42; 3 Class Hrs.; 3 Credit Hrs.

Secretarial Studies

47-11 Typing A

A thorough foundation in typewriting. Emphasis on mastery of keyboard and development of speed and accuracy. Instructions in horizontal and vertical centering and in simple letter forms. 4 Class Hrs.; 6 Lab. Hrs.; 4 Credit Hrs.

47-12 Typing B

Reconstruction of basic skills and further development of speed and accuracy. Instruction in typing of business letters, tabulations, and rough drafts. Typing of manuscripts such as term reports and theses. Prep. 47-11; 4 Class Hrs.; 6 Lab. Hrs.; 4 Credit Hrs.

47-13 Briefhand I

Principles of Briefhand - a rapid notetaking system using the longhand alphabet. 4 Class Hrs.; 4 Credit Hrs.

47-14 Briefhand II

Theory of Briefhand reviewed. Emphasis on building of speed in notetaking. Prep. 47-13; 4 Class Hrs.; 4 Credit Hrs.

Co-operative Education

50-01 Professional Development

Orientation of student's thinking along individual professional development lines; intelligent techniques of job getting.

Lectures by professional engineers covering the Activities of ECPD and EJC, Engineering Licensure, U. S. Patent System, and Ethics in Engineering Practice. Professional department chairmen discuss the various aspects of professionalism.

Concurrently, techniques of job-getting, including qualification records or resumes, letter writing, interviews, and planning and executing of the job-getting campaign, are discussed. 3 Class Hrs.; 1 Credit Hr.

50-10 Placement Techniques

Job-getting techniques covering such items as: qualification records or resumes, letter writing, interviews, and planning and executing of the job-getting campaign. 1 Class Hr.; 1 Credit Hr.

50-20 Placement Techniques

For full-time students. Job-getting techniques covering a survey of the occupational field, a market survey of opportunities, and accepted techniques related to job-getting efforts such as: qualification records, prospect files, letter writing, interviews, and planning and execution of the job-getting campaign. 2 Class Hrs.; 1 Credit Hr.

Military Science

61-01 Military Science I

Military fundamentals and objectives required of all persons entering military service; organization of the Army and ROTC leadership; care of the uniform and rifle; military courtesy, discipline, and drill. 1 Class Hr.; 2 Lab. Hrs.; 1 Credit Hr.

61-02 Military Science I

Research of American Military History; steps in the formation of the modern Army; relationship with other governmental agencies; exercise of command responsibilities by prominent military leaders. Instruction in individual weapons and marksmanship. 3 Class Hrs.; 1 Credit Hr.

61-03 Military Science I

American Military History, training in drill and individual weapons, firing on the indoor rifle range. 2 Class Hrs.; 1 Lab. Hr.; 1 Credit Hr.

61-10 Military Science II

Special drill and leadership techniques; instruction for potential non-commissioned officers within the Cadet Brigade. 1 Class Hr.; 2 Lab. Hrs.; 1 Credit Hr.

61-11 Military Science II

Principles of map and aerial-photograph interpretation, Brigadedrill. 2 Class Hrs.; 2 Lab. Hrs.; 1 Credit Hr.

61-12 Military Science II

Basic Signal Corps or Corps of Engineer military tactics. Study of missions and responsibilities of United States Army, including roles of U. S. Army Reserve and National Guard. 3 Class Hrs.; 1 Lab. Hr.; 1 Credit Hr.

61-20 Military Science III

Advanced course ROTC orientation principles, techniques, and characteristics of leadership. Moral and ethical standards developed; principles of military courtesy and discipline; customs of the service. 2 Class Hrs.; 0 Credit Hrs.

61-21 Military Science III

Communication systems engineering; general knowledge of a commander's responsibilities concerning mission, staff, and intelligence functions. Cadets advance to non-commissioned officer positions in the Brigade. 3 Class Hrs.; 2 Lab. Hrs.; 3 Credit Hrs.

61-22 Military Science III

Means and methods of signal communication and transmission media including systems employed in various branches of the Army. Study of communication equipment and military intelligence. 3 Class Hrs.; 1 Lab. Hr.; 3 Credit Hrs.

61-30 Military Science III

Organization and mission of Army Pictorial Service; major techniques of tactical and technical photography; application of military television. 2 Class Hrs.; 0 Credit Hrs.

61-31 Military Science III

Learning and practicing the principles of military teaching methods. Practical application of public speaking techniques. Leadership training in brigade drill. 3 Class Hrs.; 2 Lab. Hrs.; 3 Credit Hrs.

61-32 Military Science IV

Basic concepts of Army administration; fundamental knowledge of supply and movement of men and equipment. Automatic data processing. 3 Class Hrs.; 1 Lab. Hr.; 3 Credit Hrs.

61-40 Military Science IV

Principles of military law; operations of military courts. 3 Class Hrs.; 0 Credit Hrs.

61-41 Military Science IV

Senior cadets promoted to positions of high leadership in the Corps of Cadets. They command brigades, battle groups, companies, and platoons, or serve as staff officers, in cadet grades from First Lieutenant to Brigadier General. Responsible, under supervision, for complete training and operation of Cadet Brigade. Study of advanced signal communications systems. 3 Class Hrs.; 2 Lab. Hrs.; 3 Credit Hrs.

61-42 Military Science IV

Army staff relationships; customs of the service; orientation in the role of the United States in world affairs. 3 Class Hrs.; 1 Lab. Hr.; 3 Credit Hrs.

61-60 Military Science III

Advanced course ROTC orientation principles, techniques, and characteristics of leadership. Moral and ethical standards developed; principles of military courtesy and discipline; customs of the service. 2 Class Hrs.; 0 Credit Hrs.

61-61 Military Science III

Principles of military teaching to include practice teaching. Study of field fortifications and camouflage construction. 3 Class Hrs.; 2 Lab. Hrs.; 3 Credit Hrs.

61-62 Military Science III

Mine warfare, military structures, and engineer transportation services. 4 Class Hrs.; 3 Credit Hrs.

61-70 Military Science III

Theoretical knowledge of military explosives. 2 Class Hrs.; 0 Credit Hrs.

61-71 Military Science III

Cadet officers, assigned to junior command positions within the Brigade, continue closely supervised and personalized training. Voice development in speech and command. Principles of command psychology developed and errors analyzed. Duties and requirements for final year in Cadet Brigade. Study of construction materials and computations and maintenance of construction and transportation equipment. 3 Class Hrs.; 2 Lab. Hrs.; 3 Credit Hrs.

61-72 Military Science IV

Military roads and airfields including specifications and design criteria. Analysis of the Army logistics system; familiarization with military administration. 4 Class Hrs.; 3 Credit Hrs.

61-80 Military Science IV

Working knowledge of the staff procedure of an engineer battalion. 3 Class Hrs.; 0 Credit Hrs.

61-81 Military Science IV

Senior selected cadets promoted to positions of high leadership in the Corps of Cadets. They command the brigades, battle groups, companies, and platoons, or serve as staff officers in cadet grades from Second Lieutenant to Brigadier General. Responsible, under supervision, for complete training and operation of Cadet Brigade. Leadership and command techniques; study of engineer program for buildings and utilities construction and maintenance; study of military law. 3 Class Hrs.; 2 Lab. Hrs.; 3 Credit Hrs.

61-82 Military Science IV

Working knowledge of operations performed by an engineer battalion. Orientation on military courtesy and customs of service; instruction on role of United States in world affairs. 3 Class Hrs.; 1 Lab. Hr.; 3 Credit Hrs.

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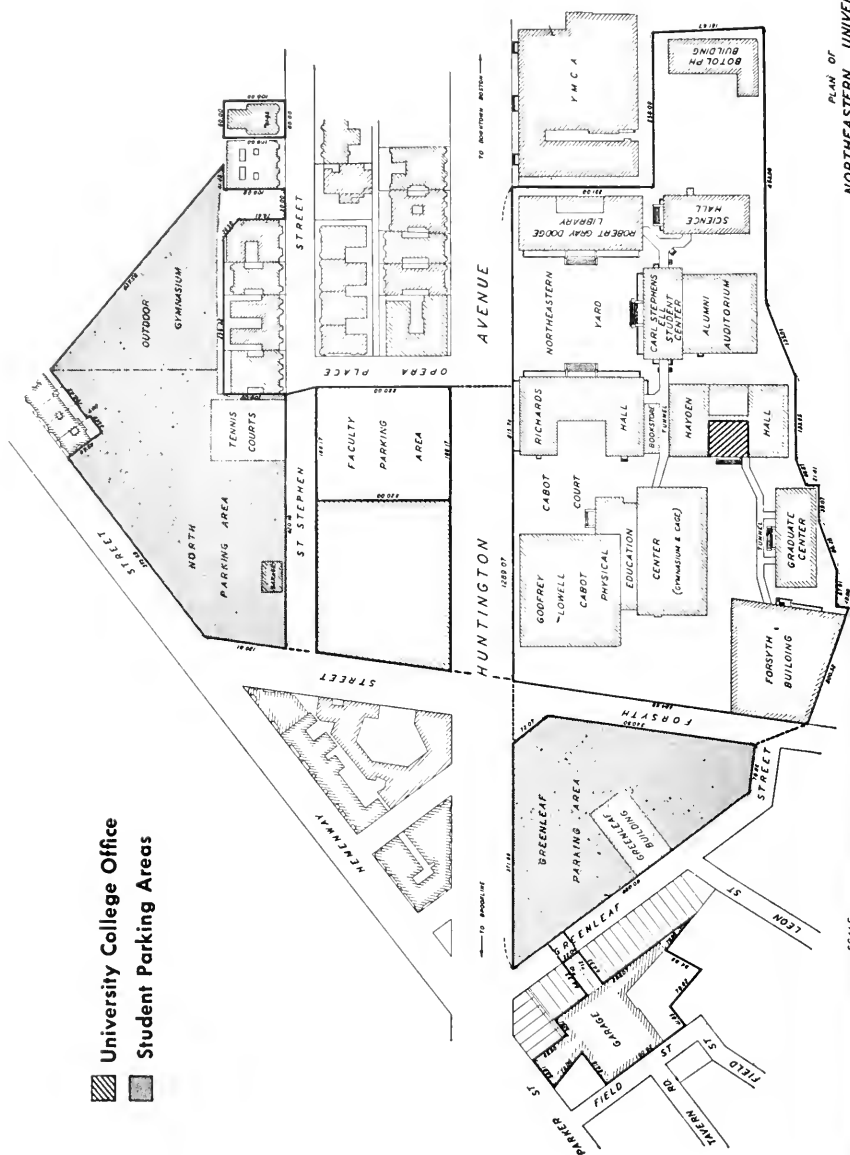


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The office is closed on all legal holidays.

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Prospective students, or those desiring advice or guidance regarding any part of the college work or curricula, are encouraged to arrange for personal interviews with the Dean or other officers of instruction. Career planning through competent guidance provides an understanding of professional requirements and develops that definiteness of purpose so vital to success.

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Calendar

1961

Summer session classes begin	May	29
Legal Holiday — No class sessions	May	30
Commencement	June	18
Legal Holiday — No class sessions	July	4
Summer session classes end	August	31
Fall semester classes begin	September	25
Legal Holiday — No class sessions	October	12
Week for first term tests	October	23-28
Legal Holiday — No class sessions	November	11
Legal Holiday — No class sessions	November	23
Week for second term tests	{November December	{27 2
Final class session before Christmas recess	December	21

1962

First class session after Christmas recess	January	2
Final examinations, fall semester	January	22-27
Spring semester classes begin	February	5
Legal Holiday — No class sessions	February	22
Week of first term tests	March	5-10
Week of second term tests	April	9-14
Legal Holiday — No class sessions	April	19
Final examinations — spring semester	May	21-26
Summer session classes begin	May	28
Legal Holiday — No class sessions	May	30
Commencement	June	17
Summer session classes end	August	30

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Sales Representative, Hooper-Kimball, Inc.
- ERWIN VON ALLMEN, B.A., University of Connecticut; M.A., Williams College; M.B.A., Harvard University
Principles of Distribution
Staff Consultant, Arthur D. Little, Inc.

MARK WAINER, LL.B., LL.M., Boston University
Legal Aspects of Business
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Man's Cultural Inheritance
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Northeastern University

General Statement

AIMS AND SCOPE OF THE UNIVERSITY

Founded in 1898, Northeastern University is incorporated as a privately endowed non-sectarian institution of higher learning under the General Laws of Massachusetts. The State Legislature by special enactment has given the University general degree granting powers. The University is governed by a Board of Trustees who are elected by and from the Northeastern University Corporation which is comprised of more than a hundred distinguished business and professional men.

From its beginning Northeastern University has had as its dominant purpose the discovery of community educational needs and the meeting of these in distinctive and serviceable ways. The University has not duplicated the programs of other institutions, but has sought to pioneer new areas of educational service.

A distinctive feature of Northeastern University is its Co-operative Plan, initiated by the College of Engineering in 1909 and subsequently adopted by the Colleges of Business Administration (1922), Liberal Arts (1935), and Education (1953). This serviceable educational method enables students to gain valuable practical experience as an integral part of their college programs and also provides the means by which they may contribute substantially to the cost of their education. The plan has been extended to the graduate level in several fields of engineering in co-operation with industrial corporations located throughout the United States.

In the field of adult education, programs of study have been developed to meet a variety of needs. Since 1906 evening curricula have been offered leading to the bachelor's degree in business and carefully planned to serve mature students who are employed full time during the day but who are desirous of broadening their educational background by part-time study. Similar evening programs in the arts and sciences, in engineering, and in teacher education have been added in recent years. All formal courses of study leading to degrees through evening programs are approved by the appropriate college faculty and are subject to the same quantitative and qualitative standards as the regular day curricula.

The following is a brief outline of the aims and scope of the University's programs.

I. The Five Colleges

1. *The College of Liberal Arts*

The College of Liberal Arts offers majors in the usual fields of the arts and sciences leading to the degrees of Bachelor of Arts and Bachelor of Science. With the exception of pre-professional programs, day curricula are normally five years in length and operated on the Co-operative Plan. In all

majors except chemistry and physics, however, qualified students with the approval of the Dean may elect to complete requirements for the degree on a full-time plan in four years. The College also offers a number of its courses during evening hours, constituting a program leading to the Bachelor of Arts degree with curricula in economics, English, history, political science, and sociology.

2. *The College of Education*

The College of Education offers the option of study on the conventional four-year full-time plan or on the five-year Co-operative Plan which provides for a period of teacher-internship in various school systems of the Greater Boston area. Both programs lead to the degree of Bachelor of Science in Education and are designed particularly to meet the needs of high school graduates who desire to prepare themselves for teaching or administrative positions in elementary and secondary schools.

The College also offers evening curricula leading to the degree of Bachelor of Science in Education in co-operation with the College of Liberal Arts.

3. *The College of Business Administration*

The College of Business Administration offers day programs of study in the principal fields of business leading to the degree of Bachelor of Science in Business Administration. The programs are offered on the five-year Co-operative Plan under which students gain substantial practical experience in the fields for which they are preparing as an integral part of their undergraduate course of study.

4. *The College of Engineering*

The College of Engineering offers five-year co-operative curricula in civil, mechanical, electrical, chemical, and industrial engineering leading to the degree of Bachelor of Science with specification according to the engineering department in which the student qualified.

The College also offers during evening hours a full program leading to the degree of Bachelor of Science in Electrical Engineering. This program extends over eight years, covers the identical courses given in the day co-operative curriculum, and meets the same qualitative and quantitative standards of scholarship.

5. *University College*

University College, so called because it draws upon the resources of the other Colleges of the University, offers courses of study leading to certificates, associate degrees, or to Bachelor of Science degrees. Programs of the College are designed specifically to meet the needs of older, more mature students who wish to undertake part-time programs of education during evening hours.

Quality standards of instruction and the requirements for its degree are wholly consistent with those of the other Colleges of Northeastern University. University College does not duplicate the offerings of the Colleges of Liberal Arts, Business Administration, Education, and Engineering, but provides curricula which cut across traditional subject matter areas and meet the particular needs of adults desiring formal programs of professional development on a part-time basis.

II. The Graduate School

The Graduate School of the University offers day and evening programs of study leading to appropriate masters degrees in the fields of arts and sciences, education, business, and engineering. Some of these programs are offered on the Co-operative Plan; others provide teaching and research fellowships for able candidates. Administrative headquarters for all graduate programs are located on the first floor of the Graduate Center Building where the offices of the Dean and of the several directors of professional programs are located.

The Graduate School also offers programs leading to the Ph.D. degrees in Physics and Chemistry.

III. Lincoln Institute

Lincoln Institute offers evening programs of study in several fields of science and engineering technology leading to the degree of Associate in Science or Associate in Engineering. The courses of study are of college grade and cover much of the technological subject matter customarily included in schools of engineering, but the curricula are less extensive in scope than those required for the baccalaureate degree in engineering. They prepare students to work with professional engineers in various technical capacities.

IV. Center for Continuing Education

The Center for Continuing Education develops and offers special educational programs and services for the civic, business, and industrial community. These include the Bureau of Business and Industrial Training, which provides both off-campus and in-plant programs custom-built to serve specific training needs; the Department of Special Programs, which offers on-campus courses, seminars, conferences, and forums — usually co-operatively with professional societies, trade associations or civic agencies — to communicate information about current trends and the on-going needs of a changing society.

V. Research Activities

The faculty of the University are engaged upon a wide variety of basic research projects in business, science, social science, and engineering. These are co-ordinated by the Dean of Research Administration whose services are University-wide and available to the faculties of all the Colleges.

Although Northeastern is primarily concerned with undergraduate and graduate instruction in the areas of arts and sciences, business, engineering, and teacher education, the University believes that the most effective teaching and learning takes place in an environment characterized by research activities directed toward extending the frontiers of knowledge.

BUILDINGS AND FACILITIES

University Buildings

LOCATION

Northeastern University is located on Huntington Avenue, Boston. The main administrative offices of the University are located in Richards Hall.

The chief railroad centers of Boston are the North and South Stations. To reach the University from the North Station, board an MTA subway car going to Park Street and transfer there to any Huntington Avenue car. To reach the University from South Station, board a Cambridge-bound subway train and transfer at Park Street to a Huntington Avenue car. The "Northeastern" station is the first stop outside the subway.

HUNTINGTON AVENUE CAMPUS

The principal educational buildings of Northeastern University are located on a sixteen-acre site in the Back Bay section of Boston. Only one block to the west of the University lie the famous Boston Museum of Fine Arts and the beautiful public gardens park reservation known as "The Fenway."

Following a long-range development plan, University facilities have expanded substantially in recent years. In addition to the seven buildings constructed within the last two decades, several modernized older buildings are available for specialized uses. The newer buildings on the campus are interconnected by means of tunnels, so that the students may go from building to building without going out of doors in inclement weather.

In addition to classrooms and instructional offices, the principal buildings include the following:

Botolph Building — Civil Engineering laboratories

Forsyth Building — Industrial and Mechanical Engineering laboratories and Health Department

Greenleaf Building — ROTC headquarters, research facilities

The Robert Gray Dodge Library — Library, drawing rooms

Science Hall — Chemical Engineering and Biology laboratories

The Carl Stephens Ell Student Center — Student Activities, chapel, auditorium, and University Commons

Richards Hall — Administrative offices, Mechanical Engineering, Psychology and Chemistry laboratories, bookstore

The Godfrey Lowell Cabot Physical Education Center — gymnasium, cage, rifle range

Hayden Hall — Evening Division offices, Business, Education, and Electrical Engineering laboratories, art studio

Graduate Center — Administrative offices of the Graduate School, Physics laboratories and cafeteria

University College

The Philosophy of University College

The establishment of University College in 1960 as the fifth College in the Northeastern University system, with academic programs designed especially for adults, represents a pioneering move in American education. It represents Northeastern University's commitment to the philosophy of higher education for adults, which recognizes that the true function can be achieved only if the characteristics which differentiate the mature adult can be reflected in the course design and methodologies of instruction and administration.

It recognizes the true significance of the factors inherent in education for adults — that, through knowledge and understanding gained through work and life experiences, the adult brings to the classroom ingredients of maturity, earnestness of purpose and understanding evolving out of a strong career orientation which places special demands upon education.

It recognizes that education, to be truly realistic in serving the needs of adults, must be flexible, unrestricted by traditional approaches, and accepts one's total education as resulting from many contributing factors. University College in drawing from the full resources of the University colleges will cut across traditional educational patterns as it interprets special and changing needs and reflects them in forward-looking programs.

Education that truly serves the mature man or woman while based upon sound fundamentals must dig beneath the surface for supporting details — must relate generalities of subject matter to the reality of actual practice. The background of understanding of the mature student makes such teaching possible and meaningful. There are many *plus values* which are possible in adult education truly conceived.

Staff of Instruction

The teaching staff of University College, in addition to representing all colleges of Northeastern University, is also recruited from business and professional leaders of New England. Adults are demanding of their teachers in professional competence, ability to communicate, and friendliness of attitude. The faculty have proved their ability in their various fields of specialization and are selected on the basis of their ability to impart knowledge to others in an interesting, inspiring, and effective manner, drawing upon rich backgrounds of training and experience.

The Student Body

The cross section of the student body populating University College represents a heterogeneity of backgrounds and interests which properly recognized and utilized becomes one of the basic strengths in adult education.

The evening college student as a mature person — with real life problems — demands an educational pattern that is closely attuned to his professional advancement. His individual needs will vary from a specific course to a full degree curriculum.

With a specific commitment to education for mature adults, it is planned that those more recently graduated from high school would pursue traditional

programs in the other colleges. This makes possible in University College a greater degree of homogeneity, resulting in higher concentration on the needs of the adults.

With a broad age range, the average age approximates thirty; about two-thirds of the students are married men who have realized that positions of increased responsibility require advanced preparation. This has been conclusively proved by a study which showed substantial increases in income during the period of attendance.

Placement Service

For Students

Many requests from employers are received by the College, during normal times, for young men and women of potential ability to fill important positions of responsibility. It is the policy of the College to serve the students whenever possible by placing them in those positions which promise attractive opportunities for development and advancement. The College, however, cannot guarantee to place its students, but it does endeavor to keep in close touch with those who desire placement service and to assist them in obtaining satisfactory advancements in positions and income. No charge is made for placement service. Those needing this assistance should arrange an appointment with the Director of Placement and Guidance.

For Graduates

While the College cannot guarantee positions to its graduates, the number of requests for men usually exceeds the number available in the graduating class of any given year. The policy of the College is to find the best equipped and qualified men and women among its graduates for the positions which the College is called upon to fill.

The College in recommending a graduate for a position furnishes the prospective employer with the facts as to the graduate's ability, character, attitudes, habits, and other qualifications for the position as revealed by the College records. In the last analysis, however, placement in a position depends quite largely upon the graduate's ability to sell his services to the prospective employer. Most employers prefer to consider two or more candidates for a position and generally request the College to suggest more than one person. Many manufacturing and commercial firms throughout New England call upon this College to assist them in filling important executive and managerial positions.

No charge is made for placement service.

University College

Administrative Policies

Requirements for Admission

All applicants whose credentials are approved by the Committee on Education are admitted as regular or special students.

Regular Students

Applicants for admission as regular students must present evidence of the completion of an approved secondary school course, or the equivalent 15 units.*

Matriculation as a Degree Candidate

The procedure of formal matriculation as a degree candidate is deferred to provide the student ample opportunity to:

- (1) Become adjusted to the conditions of evening study and appreciate and accept the requirements of self-discipline necessary for successful scholastic achievement.
- (2) Determine under qualified guidance his major potentials translated into his major field of professional interest.
- (3) Demonstrate to his own satisfaction as well as to the College administration his ability to meet the standards established for all degree recipients.

The conditions for admission to degree candidacy are as follows:

- (1) The student will officially petition the faculty for admission to the status of a degree candidate. A five-dollar matriculation fee will accompany the petition.
- (2) The student will have completed no less than 30 semester hours of work in University College.
- (3) Included in the 30 semester hours of course credit, the student must have satisfactorily completed the foundation courses in the fields of English, accounting, economics and mathematics.
- (4) The student must achieve a cumulative average of 2.00 on a numerical equivalency basis for all courses completed prior to filing his petition.
- (5) Evidence of probable academic success will be demonstrated through an educational qualification test administered by University College.

Special Students

Applicants whose needs and interests can be best served through enrollment in one or more courses or in a certificate program may be admitted

*A unit represents a year's work in any subject in any approved secondary school constituting approximately a quarter of a full year's work, or the equivalent. A four-year day high school course is regarded as representing at least 15 units of work, or 3 units in junior high school and 12 units in a three-year senior high school.

as special students provided they satisfy the admission requirements for regular students or the equivalent in training and experience as evidence of their probable success and their ability to profit by the courses.

Registration

Before attending classes, students must report to University College Office for registration. Registrations will be accepted beginning May 1st for the following College year. Applicants are requested to register during the summer months to lessen the congestion during the opening week. No student will be allowed to register for any course after the second session without special permission from the Dean.

A schedule of classes may be obtained by applying at the University College Office.

Transfer Students and Advanced Standing Credit

Advanced standing credit in the College may be obtained in one or both of two ways as follows:

By Transfer of Credit. Subject to the approval of the Committee on Education, credit may be given for work completed in other approved schools, colleges and universities. An applicant desiring credit by transfer should indicate his desire at the time of filing his application for admission. The applicant should instruct the Registrar of the institution of previous attendance to mail an official transcript direct to University College indicating honorable dismissal, courses completed, credits and grades.

By Examination. 1. For credit: No advanced standing credit is awarded except for work previously completed in courses comparable to those offered in University College or compatible with the objective of the student's curriculum. Credit may be disallowed for work previously completed due to the remoteness of the time of study. These applicants, however, will be granted the privilege of taking an examination for credit.

2. For placement: Applicants who, as a result of previous training and experience, may be considered to possess sufficient knowledge of a subject will be allowed the privilege of taking a special examination in particular courses.

The grade of B or better must be obtained in any examinations taken for placement or advanced standing credit. Students who have been dismissed from another institution for academic reasons must accompany their application with a statement from the Dean or other appropriate official of their previous institution setting forth the reasons for dismissal or probationary status with recommendation for continued study. All applications will be considered on their own merits.

In all cases students admitted by transfer or advanced standing credit from any other institution must meet the requirements for matriculated status as set forth under the regulations applicable to regular students.

Resident Requirement

Every candidate for the B.S. or Associate Degree must fulfill the residence requirement. The residence requirement is defined as the taking and satisfactory completion in University College immediately preceding graduation of 30 consecutive semester hours of work in course; with the further provision that at least 10 of the 30 semester hours must be in the candidate's major field. All programs to meet the residency requirement must have the approval of the Dean. Students whose attendance in degree programs is interrupted for a period of one year or more will be reinstated into the program in effect at the time of their re-entry into University College.

In the case of students who for causes beyond their control move outside of the reasonable commuting area of the College, and who have completed 100 or more semester hours of credit in course, the Committee on Education will entertain a petition to allow them the privilege of completing their degree requirements at some other approved College. Under no circumstances will a degree be awarded to any student who has completed less than 30 semester hours of credit in courses in University College.

Students attending certificate programs must complete in residence the full semester hour requirements of the programs in required courses or substitutions approved by the Dean.

Attendance at Commencement

All candidates for a first degree (bachelor or associate) are required to attend Commencement in the year of qualification. First degrees in absentia are awarded only to candidates excused for personal or immediate-family illness, military service, or employment obligations beyond the control of the candidate.

A petition to receive a degree in absentia must be presented to the dean of the school or college in which the candidate qualifies. Each petition will be acted upon by the academic dean involved, the candidate having the privilege of appeal to the Provost.

Degree Requirements

- I. The Degree of Bachelor of Science (B.S.) is awarded upon completion of 130 semester hours of credit in course according to the following credit distribution:

	Semester Hours
a. Core Courses and Sequences in Liberal Arts	74
b. Professional and Elective Courses	56
Total requirements for the degree	130

See each curriculum for specific requirements in professional area. (See pages 49-74.)

- II. The Associate Degree is awarded upon completion of a minimum of 60 semester hours of credit in course sequences approved by the faculty to students who have satisfied the requirements for degree matriculation.

Graduation with Honors

Honors are based upon the excellence of the work performed by the students in the College. Three honorary distinctions are conferred upon properly qualified candidates for the bachelor's degree upon graduation:

Highest honors to those who have completed all work with a quality point average of 3.75 or better.

High honors to those who have completed all work with a quality point average of 3.50 or better.

Honors to those who have completed all work with a quality point average of 3.25 or better.

To be entitled to honors a student must have completed a minimum of 60 semester hours of work in University College.

Courses credited by advanced standing, whether by transfer or by examination, will be eliminated in determining honors.

University College

General Information

Class Sessions

Classes are held each evening, Monday through Friday, and on Saturday morning. *The normal schedule for students pursuing a degree, title or certificate program is not more than eight semester hours per semester. Students may arrange their schedules so as to attend classes one, two or three sessions a week, depending upon the number of subjects taken.* Students interested in the schedule of classes should apply to the College Office.

Attendance

The limited amount of time devoted to each subject and the rapid rate of progress in covering the essential content of a course make it highly desirable that students be present at every session. Because of the importance of regular attendance and its bearing upon the quality of scholarship, the policies governing attendance are:

Students must attend 70% of the lecture sessions to be eligible to take the final examination.

Attendance credit is granted only when the student is in attendance at least three-quarters of the class period. Three separate absences of less than 30 minutes each constitute one complete absence.

Outside Preparation

It is expected that students will devote on the average two hours to preparation for each hour spent in the classroom. A student carrying a normal program will, therefore, be expected to devote to outside preparation an average of eleven to twelve hours a week. Some courses require more time for preparation than others.

Notify the Office Immediately

Of change of address.

Of withdrawal from any course.

Of withdrawal from the College, giving date of the last session attended.

Term Tests

Two one-hour tests are regularly scheduled in each semester, usually on the sixth and eleventh sessions. These tests are regarded as part of the term or course work. A student who, for justifiable reasons, fails to take a term test may be allowed one make-up privilege upon petition for the same within one week of the date of the original test. The registrar will assign the time and place. A fee of \$3.00 is charged for each make-up test, payable at the time of filing the petition.

Final Examination

The general policies governing final examinations are:

A final examination will be held at the end of each course unless an announcement to the contrary is made.

The minimum passing grade in a regular final examination is D.

Students who, for justifiable reasons, are unable to take a final examination will receive a grade of "incomplete" and may be allowed the privilege of a make-up examination. This examination will be considered as the original examination for grading purposes.

A fee of \$5.00 is payable at time of filing petition for make-up examination.

Make-up Examinations

The following policies govern re-examinations:

Permission for taking a make-up examination is dependent upon the quality of the work which the student has done throughout the course and is a privilege which the Committee on Education may grant to students.

The make-up examinations are given on specified dates. Students will be notified of the specific dates of each examination.

A make-up examination for an incomplete grade must be taken within the next academic year, and all grades of "Incomplete" must be cleared within one academic year or the grade becomes N.C., and the course must be repeated for credit.

Marks and Credits

The following system of grading is in use:

Superior Work, A; Above Average Work, B; Average Work, C; Lowest Passing Grade, D; Failure, F; Incomplete, Inc.; N.C., Non-Credit.

Quality Points

The requirement for graduation from University College is 130 semester hours with attainment of a quality point average of 2.00. Although the credits allowed for acceptable work completed elsewhere by transfer students count towards fulfillment of quantitative graduation requirements, neither the credits nor the grades earned in such courses are included in quality point computations for graduation.

The method of figuring quality points is as follows: Each semester course of A grade is multiplied by 4, B grade by 3, C grade by 2, D grade by 1, and F grade or Incomplete by 0. The total number of quality points, divided by the total number of semester courses completed, shall be the quality point average.

Students receiving an F grade in a required course must repeat the course in its entirety including term work, examinations and attendance.

The policy is followed of mailing all grade and status reports to students instead of issuing these reports at the College Office or over the telephone.

Probation and Discipline

The Committee on Education, in dealing with students whose work in the College may be unsatisfactory, or whose conduct is such as to make it inadvisable for them to continue as members of the student body, considers each case upon its individual merits. The following general principles are kept in mind in handling such cases:

Students whose scholarship in any given year is unsatisfactory may be dropped from the College or may be placed on probation.

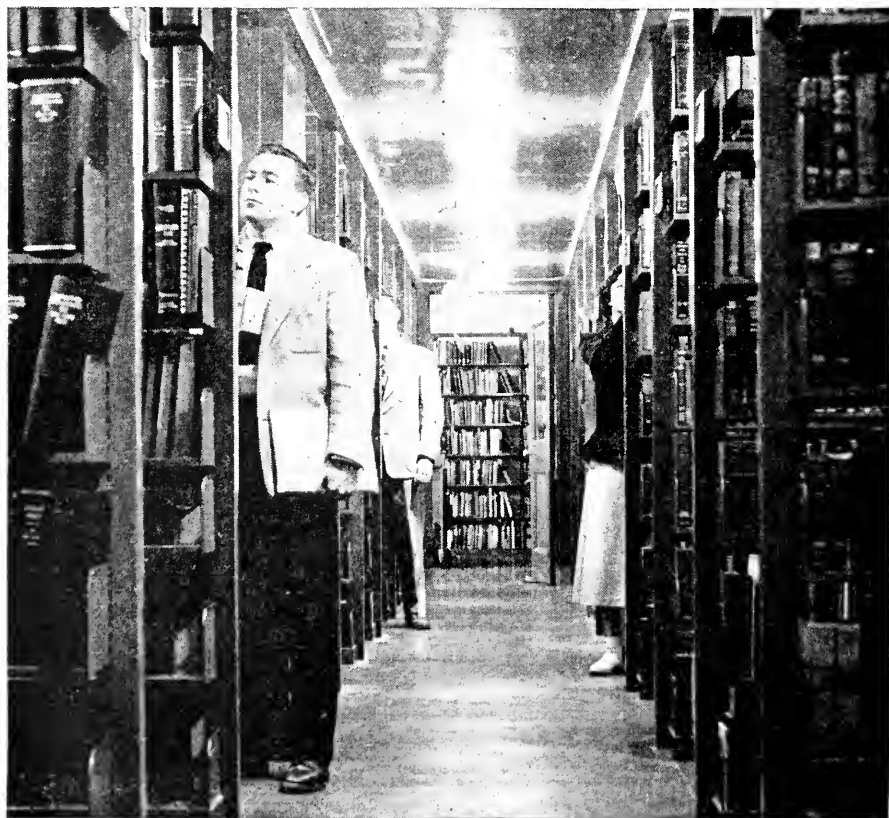
When a student is placed on probation, the probation is formally imposed for a definite time and can only be extended by approval of the Committee on Education.

The Administrative Committee has the authority to dismiss from the College or place on probation at any time or to strike from the list of candidates for the degree any student whom it may deem unworthy either on account of unsatisfactory scholarship or for any great defect of conduct or character. The Committee may ask any student to withdraw from the College who is obviously out of sympathy with the aims and ideals of the College.

Classrooms and Libraries

The classrooms are furnished with modern equipment and are thoroughly adapted to evening school work. Improvements in classroom facilities are constantly being made to meet the needs of the student body.

In connection with the General Library of the University a special section is devoted to books on business subjects. In addition, the leading trade and business magazines are available for student use. Additions are constantly being made to the business section of the Library in recognition of the new demands for business education and research. The reading rooms of the



Library are open Monday through Friday from 8:30 A.M. to 10:00 P.M. They close at 4:00 P.M. on Saturdays and are not open Sundays and holidays.

All members of the College are entitled to the privilege of using the Boston Public Library including the Business Branch at 20 City Hall Avenue.

Textbooks and Supplies

The Northeastern University Bookstore is a department of the University and is operated for the convenience of the student body. All books and supplies which are required by the students for their work in the University may be purchased at the Bookstore located in Richards Hall. In addition, the Bookstore also carries a large number of general supplies.

Student Council

The social and extracurricular life of the College is in charge of the Student Council, consisting of representatives from each class or school group. In addition to arranging for occasional social affairs, special lectures and meetings, the Council represents the interests of the student body. The faculty and the officials advise with the Council in regard to College policies.



The Student Council sponsors two dances each year for University College students and guests.

Honor Fraternity

Sigma Epsilon Rho is the honor fraternity of University College. Its purposes are:

To promote acquaintance and good fellowship among those men who have attained highest scholastic standing in the College.

To stimulate the student body to higher scholastic accomplishment through the bearing, influence and work of these selected men.

To develop methods of mutual improvement and advancement among the members of this fraternity.

To support high moral, professional and scholastic ideals.

Only honor graduates or seniors with honor standing at the end of the junior year are eligible for admission to the fraternity. Admission is by invitation after nomination by the fraternity.

An outstanding business book is awarded each year by Sigma Epsilon Rho Fraternity to the highest ranking student at the conclusion of the junior year. Students will receive the award only in the event that they enroll for the subsequent year.

University College

Tuition, Fees and Scholarships

Tuition and fees are not transferable and are refundable only as stated under "Refund of Tuition."

Checks and drafts for all charges are to be drawn to the order of Northeastern University.

There are no auditors or auditor's rates in University College.

Application Fee

The University application fee of \$5.00 must accompany the initial application for admission to the University. This fee is non-refundable.

Matriculation Fee

A matriculation fee of \$5.00 must accompany the petition for degree candidacy filed after the completion of 30 semester hours of work in University College and under the conditions set forth for matriculation as a degree candidate. This fee is non-refundable.

Tuition

Tuition for all credit courses is charged at the rate of twenty-two dollars (\$22.00) per semester hour of credit. Charges for registration and tuition for special courses are at the rate and on the basis of payment specified for each course.

Tuition for degree or certificate candidates for all credit courses is charged on the semester basis payable at the beginning of each semester. As a convenience, however, the tuition each semester may be payable in two (2) installments; the second installment is payable on November 15 and March 1 in the first and second semesters respectively.

Tuition for a special student registered in a special course is charged for the entire course and is payable in a single payment at the beginning of the course unless otherwise arranged.

Tuition Budget Payment Plans

Occasionally situations develop — usually beyond the control of the student — which make it difficult to meet the payments in the manner outlined above. Under such circumstances the student is advised to discuss his problem personally with the Bursar's Office where one of the budget plans or a deferred payment agreement may be worked out. Such arrangements should be made before the end of the first week of the semester or within one week of the date of registration if the student enters late. Failure to take immediate action will result in a late payment fee.

Tuition Underwritten by Employers

An increasing number of companies are underwriting in part or whole the cost of tuition of students in their employ. In cases where payment is to be made directly by the employer to the University, the student should furnish to the Bursar's Office a purchase order covering his registration or a statement from an officer of his company certifying that the company is underwriting the tuition.

Late Payment Fee

Bills for tuition and fees are payable on or before Saturday of the week of issuance. A Late Payment Fee of \$2.00 is charged for all students failing to comply unless special payment arrangements are approved by the Bursar's Office.

Courses in Other Departments of the University

University College students assigned to courses in other departments of the University are charged the tuition rates and other fees effective in the departments to which they are assigned.

General Fees

A fee of \$3.00 is charged for each make-up test, \$5.00 for each make-up final examination or advanced standing examination. This fee must be paid at the time of filing the petition for the privilege.

The University graduation fee, charged to those who are candidates for the Bachelor or Associate degree, is \$20, payable on or before May 1st of the year in which the student expects to graduate.

Expense for Books and Materials

Students purchase their own textbooks and working materials. The cost varies according to the subjects for which the student is enrolled. The average cost for a normal program of three subjects is about \$15, with a maximum of approximately \$25. The textbooks for single courses range from \$5.00 to \$10.00.

General Financial Information

Checks should be drawn payable to Northeastern University.

Students are not permitted to attend class sessions or take any examination or tests until they have paid their tuition fees or have made satisfactory arrangements for payments.

Students will not be advanced in class standing, or permitted to re-enroll in the University, nor will degrees be conferred until all financial obligations to the University have been met.

No certificate of honorable dismissal will be issued to any student who has not fully met his financial obligations to the University.

Statement of Tuition Refund Policy

The University provides all instruction and accommodations on an academic semester basis; therefore, no refunds are granted except in cases where students are compelled to withdraw on account of personal illness or other reasons beyond their control. In no event will a refund be made if individual's attendance is recorded beyond the fifth class session. A student must complete an official withdrawal application before being considered for refund. Questions regarding refunds should be discussed with the Bursar's Office.

Scholarships, Awards and Loan Funds

The following scholarships and awards are available to students enrolled for a normal schedule of fifteen or more semester hours of classwork who are pursuing a degree program in University College.

THE CLARKSON ALUMNI AWARD

This award, made available through the Alumni Association of the University College, is in memory of George S. Clarkson, a member of the Class of 1914 and an instructor in Accounting for many years. This award, which is indeterminate in amount, is granted to the student who obtains the highest cumulative average in one of the Accounting curricula at the close of his Junior year. To be eligible, the student must have completed 30 semester hours of credit in residence in Accounting courses. If he is eligible for an award of greater monetary value, the Clarkson Alumni Award will be made to the next highest ranking student who is eligible. To be eligible for this scholarship the student must pursue a normal schedule the following year.

DEAN RUSSELL WHITNEY MEMORIAL SCHOLARSHIP

Alpha Chapter of the Pi Tau Kappa Fraternity sponsors an annual tuition scholarship in memory of former Dean Russell Whitney. The award is made available to the man in the University College whose qualities of leadership and influence among his fellow students, whose strength of character, whose record of scholarship and broad achievement mark him as outstanding. The award is made available to the student who has completed a minimum of 60 semester hours. To be eligible for this scholarship the student must pursue a normal schedule during the year in which the award is made.

KAPPA TAU PHI SCHOLARSHIP

This scholarship award of one quarter tuition is made available by the Kappa Tau Phi Sorority. It is granted annually to the woman student who ranks highest in her class at the end of the Upper-Middler year unless she is eligible for an award of greater monetary value, in which event the award will be made to the next highest ranking woman student. To be eligible for this scholarship, the student must be enrolled in a program of at least two evenings per week and pursue a like schedule in the following year. She must be a candidate for a bachelor's degree and not be eligible for assistance under the G.I. Bill of Rights. In determining this award, grades of all courses completed in prior years shall be considered.

HARRY OLINS SCHOLARSHIP

The Harry Olins Scholarship Fund was established as an expression of firm belief in the University College students and "what they stand for." The fund, presented by Mrs. Harry Olins in recognition of her husband's long service on the faculty, makes available an annual tuition award to that student who in terms of scholastic achievement, character, and personal need best typifies the spirit of Northeastern University.

To be eligible for this award the student must be a degree candidate and carry a full academic load during the school year.

TRAFFIC CLUB OF NEW ENGLAND SCHOLARSHIP

The Traffic Club of New England provides four scholarships annually for persons employed in the field of transportation and traffic management. Each scholarship covers tuition, books, and incidental expenses involved in the two courses, "Transportation Practices" and "Traffic Management." The objective of the scholarship is to introduce four new persons annually to education in the field of transportation and traffic management, after which it is assumed that they will continue for the complete program at their own

expense. Two students each will be selected from carrier traffic departments and industrial traffic departments annually. The scholarship proposals are administered co-operatively by the Scholarship Committee of the Traffic Club of New England. Applications for the scholarships must be secured from and filed with the Secretary, the Traffic Club of New England, 210 Lincoln Street, Boston, Massachusetts.

ALUMNI LOAN FUND

The Alumni Association of University College has provided a loan fund which is available to students in the Senior and Junior classes who are in need of financial assistance in order to continue their studies. Applications for loans should be addressed to the Dean of the college. All applications must be approved by the Alumni Loan Fund Committee.

UNIVERSITY COLLEGE LOAN FUND

By vote of the Student Council, a part of the Student Activities fees for 1937-1938 was set aside to provide a loan fund which is available to students temporarily in need of small loans for tuition or other College charges. Students needing assistance from this fund should confer with the Dean.

University College

Programs of Instruction

Programs of Instruction

UNIVERSITY COLLEGE conducts educational programs on the undergraduate level. The programs are designed to meet the varying needs of students attending evening college and are represented in four main groups:

1. The Bachelor of Science Degree (B.S.) requires 130 semester hours of credit in course.
2. The Associate Degree in Management or Accounting requires 60 semester hours of credit in course.
3. Certificate programs offered through the several Institutes which require a minimum of 30 semester hours of credit in course.
4. Single courses or special programs for the special student.

Degree Requirements

- I. University College programs leading to the Bachelor of Science Degree provide opportunities for cultural and professional development equivalent in quality and scope to those offered in the conventional four-year college enrolling full-time students.

	<i>Semester Hours</i>
a. Core Courses — and Sequences in the Liberal Arts.....	74
b. Professional and Elective Courses.....	56
Total requirements for the degree.....	130

See each curriculum for specific requirements.

Curricula are offered in the following fields:

Accounting

Public Accounting	See page 50
Commercial or Industrial Accounting	See page 51
Cost Accounting	See page 52

Management

Business Management	See page 53
Credit and Financial Management	See page 54
Industrial Management	See page 55
Insurance	See page 56
Marketing — Sales and Advertising	See page 57
Office Management	See page 58
Personnel and Industrial Relations	See page 59
Production Management	See page 60
Production Management — Material Handling	See page 61
Real Estate	See page 62
Retailing	See page 63
Transportation and Traffic Management	See page 64
Industrial Technology	See page 65

- II. Degree Curricula in Law Enforcement and Security
 Law Enforcement See page 72
 Security See page 73
- III. Degree Curricula in Liberal Arts and Management
 Administration See page 68
 Personnel and Industrial Relations See page 69
 Sales See page 70
- IV. The Associate Degree is awarded upon completion of a minimum of 60 semester hours of credit in course sequences approved by the faculty.
- V. Programs for Administrative Secretaries See page 88

Certificate Programs

The several Institute programs listed below are designed to serve those who have specific needs in relatively well-defined areas. They are professionally oriented and include courses applied to operations within the specific fields. The certificate requirements are indicated for each Institute program.

Certificate programs with specifications in:

Institute of Credit and Financial Management	See page 76
Institute for Business and Professional Secretaries	See pages 88-90
Institute of Distribution	See page 77
Institute of Industrial and Commercial Material Handling	See page 78
Institute of Insurance	See page 79
Institute of Retailing	See page 80
Institute of Transportation and Traffic Management	See page 81
Labor Relations Institute	See page 82
Office Management Institute	See page 83
Production Management Institute	See page 84
Quality Control Institute	See page 85
Real Estate Institute	See page 86

University College

Programs in Management

PUBLIC ACCOUNTING (C.P.A.)

Leading to the Degree of Bachelor of Science

semester hours

CORE COURSES — required.....50

Accounting:		
A1-2	Introductory Accounting.....	4
Distribution:		
D1-2	Principles of Distribution.....	4
Economics:		
Ec1-2	Business Economics.....	4
Ec3-4	Financing Business Operations.....	4
Ec5-6	Financial Policies and Planning.....	4
English:		
E1-2	English and Business Communications.....	4
E3-4	Business Writing and Reports.....	4
Industrial Management:		
IM8-9	Production Planning and Control.....	4
Industrial Relations:		
IR20	Labor-Management Relations.....	2
Law:		
L1-2	Legal Aspects of Business I.....	4
L3-4	Legal Aspects of Business II.....	4
Mathematics:		
M2-3	Mathematics.....	4
Statistics:		
Ec20	Management Statistics.....	2
Ec21	Management Statistics — Business Applications.....	2

LIBERAL ARTS — required.....24

LA1-2	Man and the Physical Universe	LA5-6	Man's Cultural Inheritance
LA3-4	Man in Society	LA7-8	Man and Values

PROFESSIONAL COURSES — required.....46½

A3-4	Intermediate Accounting.....	4
A5-6	Accounting Problems.....	5
A7-8	Advanced Accounting Problems.....	5
A9-10	C.P.A. Problems.....	10
A11	Fund Accounting.....	2½
A12	Constructive Accounting.....	2½
A13	Mathematics of Accounting.....	2½
A14-15	Cost Accounting.....	5
A18-19	Auditing.....	5
A50-51	Basic Federal Taxes.....	5

PROFESSIONAL COURSES — elective.....9½
130

Selected from the following:

A34	Anal. of Financial Statements	Ec34-35	Bus. Png. and Research
A35-36	Controllershship	In3	Insurance for Management
A37	Punch Card Accounting	IR8	Tech. of Supervision
A52-53	Advanced Federal Taxes	OM1	Office Mgmt. Practices
D50	Credit Fundamentals	OM2	Scientific Mgmt. in Off. Prac.
D51	Credit Problems	OM3	Bus. Org. and Administration
Ec7	Investment Principles	OM10	Office Systems & Procedures
Ec23	Statistical Meth. in Forecasting	OM11	Forms Design and Control
Ec30	International Economics	OM15	Elec. Data Processing Systems
Ec31	Managerial Economics	OM16	Elec. Data Programming

Courses other than those listed above may be used for elective course credit upon approval of the Dean. Students should make certain that all prerequisite requirements have been satisfied before registering for courses.

COMMERCIAL OR INDUSTRIAL ACCOUNTING

Leading to the Degree of Bachelor of Science

semester hours

CORE COURSES — required..... 50**Accounting:**

A1-2 Introductory Accounting..... 4

Distribution:

D1-2 Principles of Distribution..... 4

Economics:

Ec1-2 Business Economics..... 4

Ec3-4 Financing Business Operations..... 4

Ec5-6 Financial Policies and Planning..... 4

English:

E1-2 English and Business Communications..... 4

E3-4 Business Writing and Reports..... 4

Industrial Management:

IM-9 Production Planning and Control..... 4

Industrial Relations:

IR20 Labor-Management Relations..... 2

Law:

L1-2 Legal Aspects of Business I..... 4

L3-4 Legal Aspects of Business II..... 4

Mathematics:

M2-3 Mathematics..... 4

Statistics:

Ec20 Management Statistics..... 2

Ec21 Management Statistics — Business Applications. 2

LIBERAL ARTS — required..... 24

LA1-2 Man and the Physical Universe

LA5-6 Man's Cultural Inheritance

LA3-4 Man in Society

LA7-8 Man and Values

PROFESSIONAL COURSES — required..... 41½

A3-4 Intermediate Accounting..... 4

A5-6 Accounting Problems..... 5

A7-8 Advanced Accounting Problems..... 5

A12 Constructive Accounting..... 2½

A13 Mathematics of Accounting..... 2½

A14-15 Cost Accounting..... 5

A20-21 Internal Auditing..... 5

A34 Analysis of Financial Statements..... 2½

A35-36 Controllorship..... 5

A50-51 Basic Federal Taxes..... 5

PROFESSIONAL COURSES — elective..... 14½**130****Selected from the following:**

A37 Punch Card Accounting

A52-53 Advanced Federal Taxes

D50 Credit Fundamentals

D51 Credit Problems

Ec7 Investment Principles

Ec23 Statistical Meth. in Forecasting

Ec30 International Economics

Ec31 Managerial Economics

Ec34-35 Business Plng. and Research

E12 Business Conferences

In3

Insurance for Management

IR1

Psychology for Business

IR8

Techniques of Supervision

OM1

Office Management Practices

OM2

Scientific Mgmt. in Office Prac.

OM3

Bus. Organization and Adm.

OM10

Office Systems & Procedures

OM11

Forms Design and Control

OM15

Elec. Data Processing Systems

OM16

Elec. Data Programming

Courses other than those listed above may be used for elective course credit upon approval of the Dean. Students should make certain that all prerequisite requirements have been satisfied before registering for courses.

COST ACCOUNTING

Leading to the Degree of Bachelor of Science

semester hours

CORE COURSES — required..... 50

Accounting:		
A1-2	Introductory Accounting.....	4
Distribution:		
D1-2	Principles of Distribution.....	4
Economics:		
Ec1-2	Business Economics.....	4
Ec3-4	Financing Business Operations.....	4
Ec5-6	Financial Policies and Planning.....	4
English:		
E1-2	English and Business Communications.....	4
E3-4	Business Writing and Reports.....	4
Industrial Management:		
IM8-9	Production Planning and Control.....	4
Industrial Relations:		
IR20	Labor-Management Relations.....	2
Law:		
L1-2	Legal Aspects of Business I.....	4
L3-4	Legal Aspects of Business II.....	4
Mathematics:		
M2-3	Mathematics.....	4
Statistics:		
Ec20	Management Statistics.....	2
Ec21	Management Statistics — Business Applications.....	2

LIBERAL ARTS — required..... 24

LA1-2	Man and the Physical Universe	LA5-6	Man's Cultural Inheritance
LA3-4	Man in Society	LA7-8	Man and Values

PROFESSIONAL COURSES — required..... 46½

A3-4	Intermediate Accounting.....	4
A5-6	Accounting Problems.....	5
A7-8	Advanced Accounting Problems.....	5
A12	Constructive Accounting.....	2½
A13	Mathematics of Accounting.....	2½
A14-15	Cost Accounting.....	5
A16-17	Advanced Cost Accounting.....	5
A20-21	Internal Auditing.....	5
A34	Analysis of Financial Statements.....	2½
A35-36	Controllorship.....	5
A50-51	Basic Federal Taxes.....	5

PROFESSIONAL COURSES — elective..... 9½
130

Selected from the following:

A37	Punch Card Accounting	IM15	Manufacturing Mgmt. Seminar
A52-53	Advanced Federal Taxes	IR8	Tech. of Supervision
D50	Credit Fundamentals	OM1	Office Mgmt. Practices
Ec7	Investment Principles	OM2	Scientific Mgmt. in Office Prac.
Ec23	Statistical Meth. in Forecasting	OM3	Bus. Organization and Adm.
Ec30	International Economics	OM10	Office Systems & Procedures
Ec31	Managerial Economics	OM11	Forms Design and Control
Ec34-35	Business Plng. and Research	OM15	Elec. Data Proc. Systems
In3	Insurance for Management	OM16	Elec. Data Programming

Courses other than those listed above may be used for elective course credit upon approval of the Dean. Students should make certain that all prerequisite requirements have been satisfied before registering for courses.

BUSINESS MANAGEMENT

Leading to the Degree of Bachelor of Science

semester hours

CORE COURSES — required..... 50Accounting:
A30-31 Managerial Accounting..... 4Distribution:
D1-2 Principles of Distribution..... 4Economics:
Ec1-2 Business Economics..... 4
Ec3-4 Financing Business Operations..... 4
Ec5-6 Financial Policies and Planning..... 4English:
E1-2 English and Business Communications..... 4
E3-4 Business Writing and Reports..... 4Industrial Management:
IM8-9 Production Planning and Control..... 4Industrial Relations:
IR20 Labor-Management Relations..... 2Law:
L1-2 Legal Aspects of Business I..... 4
L3-4 Legal Aspects of Business II..... 4Mathematics:
M2-3 Mathematics..... 4Statistics:
Ec20 Management Statistics..... 2
Ec21 Management Statistics — Business Applications. 2**LIBERAL ARTS** — required..... 24

LA1-2 Man and the Physical Universe LA5-6 Man's Cultural Inheritance

LA3-4 Man in Society LA7-8 Man and Values

PROFESSIONAL COURSES — required..... 29½

A32 Financial and Administrative Accounting..... 2½

A33 Managerial Cost Controls..... 2½

D50 Credit Fundamentals..... 2½

Ec12 Government Controls..... 2½

Ec23 Statistical Methods in Forecasting..... 2

Ec34-35 Business Planning and Research..... 5

OM1 Office Management Practices..... 2½

Ec31 Managerial Economics..... 2½

In3 Insurance for Management..... 2½

IR2-3 Human Relations..... 5

PROFESSIONAL COURSES — elective..... 26½

130

Selected from the following:

D51 Principles of Salesmanship
D6 Techniques of Salesmanship
D9 Sales Executive Training
D10 Market Research
D11 Mkt. Mgmt. Seminar
D20-21 Principles of Advertising
D22 Advertising Problems
D30-31 Foreign Trade
D40 Purchasing
D51 Credit Problems
Ec7 Investment Principles
Ec11 Economic Geography
Ec30 International EconomicsE10 Effective Speaking for Business
E12 Business Conferences
IM14 Materials Mgmt. Seminar
IM15 Manufacturing Mgmt. Seminar
IR1 Psychology for Business
IR4 Personnel Mgmt. Practices
IR7 Practical Training Methods
M4-5 Graphic & Math. Tech. in Ind.
OM2 Scientific Mgmt. in Office Practice
OM3 Bus. Organization & Adm.
OM15 Elec. Data Proc. Systems
OM16 Elec. Data Programming
RE1 Real Estate Fundamentals

Courses other than those listed above may be used for elective course credit upon approval of the Dean. Students should make certain that all prerequisite requirements have been satisfied before registering for courses.

CREDIT AND FINANCIAL MANAGEMENT

Leading to the Degree of Bachelor of Science

semester hours

CORE COURSES — required..... 50

Accounting:		
A30-31	Managerial Accounting.....	4
Distribution:		
D1-2	Principles of Distribution.....	4
Economics:		
Ec1-2	Business Economics.....	4
Ec3-4	Financing Business Operations.....	4
Ec5-6	Financial Policies and Planning.....	4
English:		
E1-2	English and Business Communications.....	4
E3-4	Business Writing and Reports.....	4
Industrial Management:		
IM8-9	Production Planning and Control.....	4
Industrial Relations:		
IR20	Labor-Management Relations.....	2
Law:		
L1-2	Legal Aspects of Business I.....	4
L3-4	Legal Aspects of Business II.....	4
Mathematics:		
M2-3	Mathematics.....	4
Statistics:		
Ec20	Management Statistics.....	2
Ec21	Management Statistics — Business Applications.....	2

LIBERAL ARTS — required..... 24

LA1-2	Man and the Physical Universe	LA5-6	Man's Cultural Inheritance
LA3-4	Man in Society	LA7-8	Man and Values

PROFESSIONAL COURSES — required..... 29½

A32	Financial and Administrative Accounting.....	2½
D50	Credit Fundamentals.....	2½
D51	Credit Problems.....	2½
Ec7	Investment Principles.....	2½
Ec8-9	Applied Security Analysis.....	5
Ec23	Statistical Methods in Forecasting.....	2
Ec30	International Economics.....	2½
Ec32	Monetary Policy.....	2½
Ec34-35	Business Planning and Research.....	5
In3	Insurance for Management.....	2½

PROFESSIONAL COURSES — elective..... 26½
130

Selected from the following:

A50-51	Basic Federal Taxes	Ec31	Managerial Economics
D5	Principles of Salesmanship	E10	Effective Speaking for Business
D10	Market Research	E12	Business Conferences
D20-21	Principles of Advertising	In10-11	Fidelity, Suretyship & Crime Ins.
D22	Advertising Problems	OM1	Office Mgmt. Practices
D30-31	Foreign Trade	OM2	Scientific Mgmt. in Office Prac.
D40	Purchasing	OM3	Business Org. & Administration
D52	Consumer Credit	OM11	Forms Design and Control
Ec11	Economic Geography	OM15	Elec. Data Processing Systems
Ec12	Government Controls in Bus.	OM16	Elec. Data Programming

Courses other than those listed above may be used for elective course credit upon approval of the Dean. Students should make certain that all prerequisite requirements have been satisfied before registering for courses.

INDUSTRIAL MANAGEMENT

Leading to the Degree of Bachelor of Science

semester hours

CORE COURSES — required..... 50

Accounting:		
A30-31	Managerial Accounting.....	4
Distribution:		
D1-2	Principles of Distribution.....	4
Economics:		
Ec1-2	Business Economics.....	4
Ec3-4	Financing Business Operations.....	4
Ec5-6	Financial Policies and Planning.....	4
English:		
E1-2	English and Business Communications.....	4
E3-4	Business Writing and Reports.....	4
Industrial Management:		
IM8-9	Production Planning and Control.....	4
Industrial Relations:		
IR20	Labor-Management Relations.....	2
Law:		
L1-2	Legal Aspects of Business I.....	4
L3-4	Legal Aspects of Business II.....	4
Mathematics:		
M2-3	Mathematics.....	4
Statistics:		
Ec20	Management Statistics.....	2
IM20	Management Statistics — Quality Control.....	2

LIBERAL ARTS — required..... 24

LA1-2	Man and the Physical Universe	LA5-6	Man's Cultural Inheritance
LA3-4	Man in Society	LA7-8	Man and Values

PROFESSIONAL COURSES — required..... 29

A32	Financial and Administrative Accounting.....	2½
A33	Managerial Cost Controls.....	2½
IM2	Work Measurements I.....	2½
IM5	Work Simplification I.....	2½
IM30-31	Plant Layout.....	5
IM40-41	Material Handling Fundamentals.....	5
IR2-3	Human Relations.....	5
M4-5	Graphic & Mathematical Tech. in Industry ...	4

PROFESSIONAL COURSES — elective..... 27

130

Selected from the following:

D40	Purchasing	IM21-23	Quality Control Courses
Ec31	Managerial Economics	IM42-51	Material Handling Courses
IM3	Work Measurements II	In3	Insurance for Management
IM4	Syn. Time Stds. M.T.M.	IR2-3	Human Relations
IM6	Work Simplification II	IR5	Wage Administration
IM7	Job Analysis & Evaluation	IR7	Practical Training Methods
IM10	Materials of Production	IR21	Lab. Leg. — Union-Mgmt. Relations
IM11	Production Processes	IR22	Lab. Leg. — Stds. & Conditions
IM13	Industrial Safety	IR23	Labor Agreement
IM14	Materials Mgmt. Seminar	OM3	Bus. Organization & Adm.
IM15	Manufacturing Mgmt. Seminar	T1	Transportation Practices

Courses other than those listed above may be used for elective course credit upon approval of the Dean. Students should make certain that all prerequisite requirements have been satisfied before registering for courses.

INSURANCE

Leading to the Degree of Bachelor of Science

semester hours

CORE COURSES — required..... 50

Accounting:		
A30-31	Managerial Accounting.....	4
Distribution:		
D1-2	Principles of Distribution.....	4
Economics:		
Ec1-2	Business Economics.....	4
Ec3-4	Financing Business Operations.....	4
Ec5-6	Financial Policies and Planning.....	4
English:		
E1-2	English and Business Communications.....	4
E3-4	Business Writing and Reports.....	4
Industrial Management:		
IM8-9	Production Planning and Control.....	4
Industrial Relations:		
IR20	Labor-Management Relations.....	2
Law:		
L1-2	Legal Aspects of Business I.....	4
L3-4	Legal Aspects of Business II.....	4
Mathematics:		
M2-3	Mathematics.....	4
Statistics:		
Ec20	Management Statistics.....	2
Ec21	Management Statistics — Business Applications.	2

LIBERAL ARTS — required..... 24

LA1-2	Man and the Physical Universe	LA5-6	Man's Cultural Inheritance
LA3-4	Man in Society	LA7-8	Man and Values

PROFESSIONAL COURSES — required..... 30

In2-3	Principles of Insurance.....	5
In4-5	Casualty Insurance.....	5
In6-7	Fire and Allied Lines.....	5
In8-9	Inland Marine.....	5
In10-11	Fidelity, Suretyship Crime.....	5
In13-14	Claims Procedure.....	5

PROFESSIONAL COURSES — elective..... 26

130

Selected from the following:

A32	Financial & Adm. Accounting	IR2-3	Human Relations
D5	Principles of Salesmanship	IR8	Techniques of Supervision
D6	Techniques of Salesmanship	OM1	Office Mgmt. Practices
D9	Sales Executive Training	OM2	Scientific Mgmt. in Office Prac.
D20-21	Principles of Advertising	OM3	Business Organization & Adm.
Ec7	Investment Principles	RE1	Real Estate Fundamentals
Ec34-35	Business Png. & Research	RE2	Real Estate Law & Conveyancing
E10	Effective Speaking for Business	RE3	Real Estate Mgmt. & Investment
E12	Business Conferences	RE4	Real Estate Finance
IR1	Psychology for Business	Ec23	Statistical Methods in Forecasting

Courses other than those listed above may be used for elective course credit upon approval of the Dean. Students should make certain that all prerequisite requirements have been satisfied before registering for courses.

MARKETING — SALES AND ADVERTISING

Leading to the Degree of Bachelor of Science

semester hours

CORE COURSES — required.....		50
Accounting:		
A30-31	Managerial Accounting.....	4
Distribution:		
D1-2	Principles of Distribution.....	4
Economics:		
Ec1-2	Business Economics.....	4
Ec3-4	Financing Business Operations	4
Ec5-6	Financial Policies and Planning.....	4
English:		
E1-2	English and Business Communications.....	4
E3-4	Business Writing and Reports.....	4
Industrial Management:		
IM8-9	Production Planning and Control.....	4
Industrial Relations:		
IR20	Labor-Management Relations.....	2
Law:		
L1-2	Legal Aspects of Business I.....	4
L3-4	Legal Aspects of Business II.....	4
Mathematics:		
M2-3	Mathematics.....	4
Statistics:		
Ec20	Management Statistics.....	2
Ec21	Management Statistics — Business Applications. 2	
LIBERAL ARTS — required.....		24
LA1-2	Man and the Physical Universe	LA5-6 Man's Cultural Inheritance
LA3-4	Man in Society	LA7-8 Man and Values
PROFESSIONAL COURSES — required.....		29½
A32	Financial and Administrative Accounting	2½
D5	Principles of Salesmanship.....	2½
D20-21	Principles of Advertising.....	5
D30-31	Foreign Trade.....	5
D50	Credit Fundamentals.....	2½
Ec11	Economic Geography.....	2½
Ec31	Managerial Economics.....	2½
D7	Sales Promotion.....	2½
Ec23	Statistical Methods in Forecasting.....	2
D10	Market Research.....	2½
PROFESSIONAL COURSES — elective.....		26½
		130

Selected from the following:

D6	Techniques of Salesmanship	Ec12	Government Controls in Business
D8	Sales Management	Ec30	International Economics
D9	Sales Executive Training	Ec34-35	Business Plng. and Research
D10	Market Research	E10	Effective Speaking for Business
D11	Marketing Mgmt. Seminar	E12	Business Conferences
D22	Advertising Problems	In3	Insurance for Management
D23	Advertising Copy	IR1	Psychology for Business
D24	Advertising Production	OM3	Bus. Organization and Adm.
D25	Advertising Media	OM15	Elec. Data Processing Systems
D40	Purchasing	OM16	Elec. Data Programming
D41	Consumer Packaging	R1	Retail Store Management
D42	Industrial Packaging	R2	Retail Store Merchandising
D51	Credit Problems	R3	Retail Store Advertising
D52	Consumer Credit	T1	Transportation Practices
Ec7	Investment Principles	T2	Traffic Management

Courses other than those listed above may be used for elective course credit upon approval of the Dean. Students should make certain that all prerequisite requirements have been satisfied before registering for courses.

OFFICE MANAGEMENT

Leading to the Degree of Bachelor of Science

semester hours

CORE COURSES — required..... 50

Accounting:		
A30-31	Managerial Accounting.....	4
Distribution:		
D1-2	Principles of Distribution.....	4
Economics:		
Ec1-2	Business Economics.....	4
Ec3-4	Financing Business Operations.....	4
Ec5-6	Financial Policies and Planning.....	4
English:		
E1-2	English and Business Communications.....	4
E3-4	Business Writing and Reports.....	4
Industrial Management:		
IM8-9	Production Planning and Control.....	4
Industrial Relations:		
IR20	Labor-Management Relations.....	2
Law:		
L1-2	Legal Aspects of Business I.....	4
L3-4	Legal Aspects of Business II.....	4
Mathematics:		
M2-3	Mathematics.....	4
Statistics:		
Ec20	Management Statistics.....	2
Ec21	Management Statistics — Business Applications.....	2

LIBERAL ARTS — required..... 24

LA1-2	Man and the Physical Universe	LA5-6	Man's Cultural Inheritance
LA3-4	Man in Society	LA7-8	Man and Values

PROFESSIONAL COURSES — required..... 30

A32	Financial and Administrative Accounting.....	2½
A33	Managerial Cost Controls.....	2½
D40	Purchasing.....	2½
D50	Credit Fundamentals.....	2½
In3	Insurance for Management.....	2½
OM1	Office Management Practices.....	2½
OM2	Scientific Mgmt. in Office Practice.....	2½
OM3	Business Organization & Administration.....	2½
OM10	Office Systems and Procedures.....	2½
OM11	Forms Design and Control.....	2½
OM15	Elec. Data Processing Systems.....	2½
OM16	Elec. Data Programming.....	2½

PROFESSIONAL COURSES — elective.....

26
130

Selected from the following:

D5	Principles of Salesmanship	E12	Business Conferences
D20-21	Principles of Advertising	IM7	Job Analysis & Evaluation
D51	Credit Problems	In4-5	Casualty Insurance
D52	Consumer Credit	In10-11	Fidelity, Suretyship & Crime Ins.
Ec7	Investment Principles	IR1	Psychology for Business
Ec12	Government Controls in Bus.	IR2-3	Human Relations
Ec23	Statistical Meth. in Forecasting	IR4	Personnel Mgmt. Practices
Ec31	Managerial Economics	IR6	Employment Testing
Ec34-35	Business Plng. and Research	OM12	Sys. Analysis & Improvement
E10	Effective Speaking for Business	T1	Transportation Practices

Courses other than those listed above may be used for elective course credit upon approval of the Dean. Students should make certain that all prerequisite requirements have been satisfied before registering for courses.

PERSONNEL AND INDUSTRIAL RELATIONS

Leading to the Degree of Bachelor of Science

semester hours

CORE COURSES — required..... 50

Accounting:		
A30-31	Managerial Accounting.....	4
Distribution:		
D1-2	Principles of Distribution.....	4
Economics:		
Ec1-2	Business Economics.....	4
Ec3-4	Financing Business Operations.....	4
Ec5-6	Financial Policies and Planning.....	4
English:		
E1-2	English and Business Communications.....	4
E3-4	Business Writing and Reports.....	4
Industrial Management:		
IM8-9	Production Planning and Control.....	4
Industrial Relations:		
IR20	Labor-Management Relations.....	2
Law:		
L1-2	Legal Aspects of Business I.....	4
L3-4	Legal Aspects of Business II.....	4
Mathematics:		
M2-3	Mathematics.....	4
Statistics:		
Ec20	Management Statistics.....	2
Ec21	Management Statistics — Business Applications.	2

LIBERAL ARTS — required..... 24

LA1-2	Man and the Physical Universe	LA5-6	Man's Cultural Inheritance
LA3-4	Man in Society	LA7-8	Man and Values

PROFESSIONAL COURSES — required..... 30

A32	Financial and Administrative Accounting	2½
IM2	Work Measurements I.....	2½
IM7	Job Analysis and Evaluation.....	2½
IR2-3	Human Relations.....	5
IR4	Personnel Management Practices.....	2½
IR5	Wage Administration.....	2½
IR6	Employment Testing.....	2½
IR7	Practical Training Methods.....	2½
IR21	Labor Legislation — Union-Mgmt. Relations ...	2½
IR22	Labor Legislation — Standards and Conditions.	2½
IR23	Labor Agreement.....	2½

PROFESSIONAL COURSES — elective..... 26

130

Selected from the following:

A33	Managerial Cost Controls	In3	Insurance for Management
D5	Principles of Salesmanship	IM5	Work Simplification I
Ec7	Investment Principles	IM3	Work Measurements II
Ec12	Government Controls in Bus.	IM13	Industrial Safety
Ec23	Statistical Meth. in Forecasting	IR1	Psychology for Business
Ec31	Managerial Economics	IR8	Techniques of Supervision
Ec34-35	Business Plng. & Research	OM1	Office Management Practices
E10	Effective Speaking for Business	OM2	Scientific Mgmt. in Office Practice
E12	Business Conferences	OM3	Business Org. & Administration

Courses other than those listed above may be used for elective course credit upon approval of the Dean. Students should make certain that all prerequisite requirements have been satisfied before registering for courses.

PRODUCTION MANAGEMENT

Leading to the Degree of Bachelor of Science

semester hours

CORE COURSES — required..... 50

Accounting:	
A30-31	Managerial Accounting..... 4
Distribution:	
D1-2	Principles of Distribution..... 4
Economics:	
Ec1-2	Business Economics..... 4
Ec3-4	Financing Business Operations..... 4
Ec5-6	Financial Policies and Planning..... 4
English:	
E1-2	English and Business Communications..... 4
E3-4	Business Writing and Reports..... 4
Industrial Management:	
IM8-9	Production Planning and Control..... 4
Industrial Relations:	
IR20	Labor-Management Relations..... 2
Law:	
L1-2	Legal Aspects of Business I..... 4
L3-4	Legal Aspects of Business II..... 4
Mathematics:	
M2-3	Mathematics..... 4
Statistics:	
Ec20	Management Statistics..... 2
IM20	Management Statistics — Quality Control..... 2

LIBERAL ARTS — required..... 24

LA1-2	Man and the Physical Universe	LA5-6	Man's Cultural Inheritance
LA3-4	Man in Society	LA7-8	Man and Values

PROFESSIONAL COURSES — required..... 31½

A32	Financial and Administrative Accounting..... 2½
A33	Managerial Cost Controls..... 2½
IM2	Work Measurements I..... 2½
IM5	Work Simplification I..... 2½
IM11	Production Processes..... 2½
IM14	Materials Management Seminar..... 2½
IM15	Manufacturing Mgmt. Seminar..... 2½
IM30-31	Plant Layout..... 5
IM40-41	Material Handling Fundamentals..... 5
M4-5	Graphic & Mathematical Tech. in Industry.... 4

PROFESSIONAL COURSES — elective..... 24½

130

Selected from the following:

D40	Purchasing	IR2-3	Human Relations
Ec31	Managerial Economics	IR4	Personnel Mgmt. Practices
IM3	Work Measurements II	IR5	Wage Administration
IM4	Syn. Time Stds. M.T.M.	IR6	Employment Testing
IM6	Work Simplification II	IR8	Techniques of Supervision
IM10	Materials of Production	IR21	Lab. Leg. — Union-Mgmt. Relations
IM13	Industrial Safety	IR22	Lab. Leg. — Stds. & Conditions
IM21-23	Quality Control Courses	IR23	Labor Agreement
IM42-51	Material Handling Courses	OM3	Bus. Organization & Adm.
In3	Insurance for Management	OM15	Elec. Data Processing Systems
IR1	Psychology for Business	OM16	Elec. Data Programming

Courses other than those listed above may be used for elective course credit upon approval of the Dean. Students should make certain that all prerequisite requirements have been satisfied before registering for courses.

PRODUCTION MANAGEMENT — INDUSTRIAL AND COMMERCIAL MATERIAL HANDLING

Leading to the Degree of Bachelor of Science

semester hours

CORE COURSES — required.....	50
Accounting:	
A30-31 Managerial Accounting.....	4
Distribution:	
D1-2 Principles of Distribution.....	4
Economics:	
Ec1-2 Business Economics.....	4
Ec3-4 Financing Business Operations.....	4
Ec5-6 Financial Policies and Planning.....	4
English:	
E1-2 English and Business Communications.....	4
E3-4 Business Writing and Reports.....	4
Industrial Management:	
IM8-9 Production Planning and Control.....	4
Industrial Relations:	
IR20 Labor-Management Relations.....	2
Law:	
L1-2 Legal Aspects of Business I.....	4
L3-4 Legal Aspects of Business II.....	4
Mathematics:	
M2-3 Mathematics.....	4
Statistics:	
Ec20 Management Statistics.....	2
IM20 Management Statistics — Quality Control.....	2
LIBERAL ARTS — required.....	24
LA1-2 Man and the Physical Universe	LA5-6 Man's Cultural Inheritance
LA3-4 Man in Society	LA7-8 Man and Values
PROFESSIONAL COURSES — required.....	33
*Applied Mechanics I, II.....	6
*D.C. and A.C. Theory.....	6
*Engineering Drawing I, II.....	6
*Physics I, II.....	6
IM40-41 Material Handling Fundamentals.....	5
M4-5 Graphic and Mathematical Tech. in Industry.....	4
PROFESSIONAL COURSES — elective.....	23
	130

Selected from the following:

A32 Financial and Adminis. Acct.	IM42-51 Material Handling Courses
A33 Managerial Cost Controls	In3 Insurance for Management
D40 Purchasing	In4-5 Casualty Insurance
D41 Consumer Packaging	IR2-3 Human Relations
D42 Industrial Packaging & Packing	IR7 Practical Training Methods
IM11 Production Processes	IR8 Techniques of Supervision
IM13 Industrial Safety	OM15 Elec. Data Processing
IM14 Materials Mgmt. Seminar	OM16 Elec. Data Programming
IM15 Manufacturing Mgmt. Seminar	T1 Transportation Practices
IM30-31 Plant Layout	T16 Commercial Warehousing

*These courses are taken at Lincoln Institute.

Courses other than those listed above may be used for elective course credit upon approval of the Dean. Students should make certain that all prerequisite requirements have been satisfied before registering for courses.

REAL ESTATE

Leading to the Degree of Bachelor of Science

semester hours

CORE COURSES — required..... 50

Accounting:		
A30-31	Managerial Accounting.....	4
Distribution:		
D1-2	Principles of Distribution.....	4
Economics:		
Ec1-2	Business Economics.....	4
Ec3-4	Financing Business Operations.....	4
Ec5-6	Financial Policies and Planning.....	4
English:		
E1-2	English and Business Communications.....	4
E3-4	Business Writing and Reports.....	4
Industrial Management:		
IM8-9	Production Planning and Control.....	4
Industrial Relations:		
IR20	Labor-Management Relations.....	2
Law:		
L1-2	Legal Aspects of Business I.....	4
L3-4	Legal Aspects of Business II.....	4
Mathematics:		
M2-3	Mathematics.....	4
Statistics:		
Ec20	Management Statistics.....	2
Ec21	Management Statistics — Business Applications.....	2

LIBERAL ARTS — required..... 24

LA1-2	Man and the Physical Universe	LA5-6	Man's Cultural Inheritance
LA3-4	Man in Society	LA7-8	Man and Values

PROFESSIONAL COURSES — required..... 30

A32	Financial and Administrative Accounting.....	2½
D5	Principles of Salesmanship.....	2½
In3	Insurance for Management.....	2½
RE1	Real Estate Fundamentals.....	2½
RE2	Real Estate Law and Conveyancing.....	2½
RE3	Real Estate Mgmt. and Investment.....	2½
RE4	Real Estate Finance.....	2½
RE5	Real Estate Sales and Advertising.....	2½
RE6	Operating a Real Estate Business.....	2½
RE7	Real Estate Appraisal — Residential.....	2½
RE8	Real Estate Appraisal — Commercial.....	2½
Ec7	Investment Principles.....	2½

PROFESSIONAL COURSES — elective..... 26

130

Selected from the following:

Ec12	Govt. Controls in Business	E10	Effective Speaking for Business
Ec23	Statistical Meth. in Forecasting	E12	Business Conferences
Ec31	Managerial Economics	In4-5	Casualty Insurance
Ec34-35	Bus. Plng. and Research	In6-7	Fire and Allied Lines
D10	Market Research	In10-11	Fidelity, Suretyship & Crime Ins.
D20-21	Principles of Advertising	IR1	Psychology for Business
D50	Credit Fundamentals	IR2-3	Human Relations
D51	Consumer Credit	OM1	Office Management Practices

Courses other than those listed above may be used for elective course credit upon approval of the Dean. Students should make certain that all prerequisite requirements have been satisfied before registering for courses.

RETAILING

Leading to the Degree of Bachelor of Science

semester hours

CORE COURSES — required..... 50

Accounting:

A30-31 Managerial Accounting..... 4

Distribution:

D1-2 Principles of Distribution..... 4

Economics:

Ec1-2 Business Economics..... 4

Ec3-4 Financing Business Operations..... 4

Ec5-6 Financial Policies and Planning..... 4

English:

E1-2 English and Business Communications..... 4

E3-4 Business Writing and Reports..... 4

Industrial Management:

IM8-9 Production Planning and Control..... 4

Industrial Relations:

IR20 Labor-Management Relations..... 2

Law:

L1-2 Legal Aspects of Business I..... 4

L3-4 Legal Aspects of Business II..... 4

Mathematics:

M2-3 Mathematics..... 4

Statistics:

Ec20 Management Statistics..... 2

Ec21 Management Statistics — Business Applications. 2

LIBERAL ARTS — required..... 24

LA1-2 Man and the Physical Universe

LA5-6 Man's Cultural Inheritance

LA3-4 Man in Society

LA7-8 Man and Values

PROFESSIONAL COURSES — required..... 29½

A32 Financial and Administrative Accounting..... 2½

D5 Principles of Salesmanship..... 2½

D10 Market Research..... 2½

D11 Marketing Management Seminar..... 2½

D20-21 Principles of Advertising..... 5

D50 Credit Fundamentals..... 2½

Ec23 Statistical Methods in Forecasting..... 2

Ec31 Managerial Economics..... 2½

R1 Retail Store Management..... 2½

R2 Retail Store Merchandising..... 2½

R3 Retail Store Advertising..... 2½

PROFESSIONAL COURSES — elective..... 26½

130

Selected from the following:

D6 Techniques of Salesmanship

D7 Sales Promotion

D8 Sales Management

D9 Sales Executive Training

D22 Advertising Problems

D23 Advertising Copy

D24 Advertising Production

D30-31 Foreign Trade

D40 Purchasing

D52 Consumer Credit

Ec7 Investment Principles

Ec11

Economic Geography

Ec12

Government Controls in Business

Ec30

International Economics

E10

Effective Speaking for Business

E12

Business Conferences

IR1

Psychology for Business

IR4

Personnel Mgmt. Practices

IR6

Employment Testing

IR8

Techniques of Supervision

OM3

Bus. Organization and Adm.

R4

Merch. Display for Sales Promo.

Courses other than those listed above may be used for elective course credit upon approval of the Dean. Students should make certain that all prerequisite requirements have been satisfied before registering for courses.

TRANSPORTATION AND TRAFFIC MANAGEMENT

Leading to the Degree of Bachelor of Science

semester hours

CORE COURSES — required..... 50

Accounting:	
A30-31	Managerial Accounting..... 4
Distribution:	
D1-2	Principles of Distribution..... 4
Economics:	
Ec1-2	Business Economics..... 4
Ec3-4	Financing Business Operations..... 4
Ec5-6	Financial Policies and Planning..... 4
English:	
E1-2	English and Business Communications..... 4
E3-4	Business Writing and Reports..... 4
Industrial Management:	
IM8-9	Production Planning and Control..... 4
Industrial Relations:	
IR20	Labor-Management Relations..... 2
Law:	
L1-2	Legal Aspects of Business I..... 4
L3-4	Legal Aspects of Business II..... 4
Mathematics:	
M2-3	Mathematics..... 4
Statistics:	
Ec20	Management Statistics..... 2
Ec21	Management Statistics — Business Applications. 2

LIBERAL ARTS — required..... 24

LA1-2	Man and the Physical Universe	LA5-6	Man's Cultural Inheritance
LA3-4	Man in Society	LA7-8	Man and Values

PROFESSIONAL COURSES — required..... 30

A32	Financial and Administrative Accounting.....	2½
T1	Transportation Practices.....	2½
T2	Traffic Management.....	2½
T3	Adv. Traffic Management Problems.....	2½
T5	Ocean Transportation.....	2½
T6	Air Transportation.....	2½
T7	Transportation Insurance.....	2½
T9-10	ICC Practices.....	5
T14-15	Rates and Tariffs.....	5
T16	Commercial Warehousing.....	2½

PROFESSIONAL COURSES — elective..... 26

130

Selected from the following:

D5	Principles of Salesmanship	IR2-3	Human Relations
D30-31	Foreign Trade	IR7	Practical Training Methods
D50	Credit Fundamentals	IR8	Techniques of Supervision
D51	Credit Problems	IR21	Lab. Leg. - Srds. & Cond.
Ec11	Economic Geography	IR22	Lab. Leg. - Union-Mgmt. Relations
Ec12	Government Controls	IR23	Labor Agreement
Ec30	International Economics	T4	Selling Transportation Services
E10	Effective Speaking for Business	T8	Current Transportation Problems
E12	Business Conferences	T11	Motor Carrier Operations
IM40-41	Material Hndl. Fundamentals	T13	Freight Claims for Loss & Damage
IR1	Psychology for Business	T17	Transportation Economics

Courses other than those listed above may be used for elective course credit upon approval of the Dean. Students should make certain that all prerequisite requirements have been satisfied before registering for courses.

INDUSTRIAL TECHNOLOGY

Leading to the Degree of Bachelor of Science

The Industrial Technology curriculum combines the fundamental courses in one of the several areas of engineering with an integrated program in management, the humanities and the social sciences to provide a broad background of training for those who aspire to positions of managerial responsibility where technical knowledge is required.

The curriculum is offered by University College in conjunction with the Lincoln Institute, one of the affiliated schools of Northeastern University. The technology requirements may be earned by satisfactory completion of equivalent courses in an accredited engineering college.

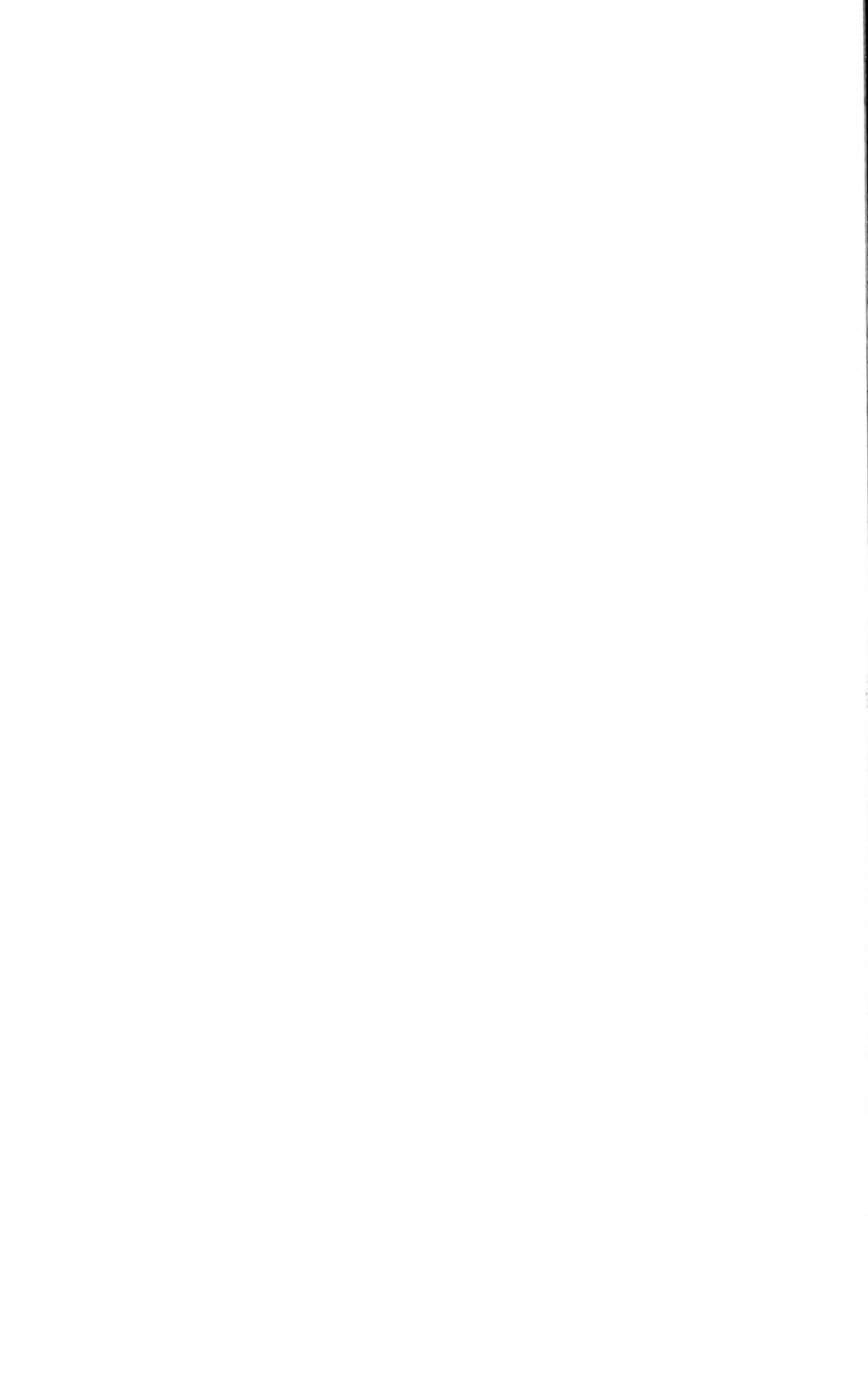
The total credit requirements for the degree are 130 semester hours distributed as follows:

				Semester Hours	
				60	
Management Courses — Required Core					
E1-2	English.....	4	A30-31	Managerial Acct....	4
Ec1-2	Economics.....	4	Ec20	Management Statist..	2
Ec3	Finance I.....	2	IM20	Man. Statistics-Qual.	
IM8-9	Industrial Management ...	4		Control.....	2
L5	Law for Engineers.....	2	IR1	Psych. for Bus. &	
IR20	Labor-Man. Rel.....	2		Ind. I.....	2½
					28½
Liberal Arts — Required				24	
LA1-2	Man and the Physical Universe		LA5-6	Man's Cultural Inheritance	
LA3-4	Man in Society		LA7-8	Man and Values	
Management Courses — Electives					
(chosen from one of the options listed below)				17½	
Total semester hours required for degree				130	

OPTIONS

Production		Semester Hours	Technical Sales		Semester Hours
IM5	Work Simplification I.....	2½	Ec12	Government Controls.....	2½
IM2	Work Measurements I.....	2½	D1-2	Distribution, Prin.....	4
IM11	Production Processes.....	2½	D40	Purchasing.....	2½
IM40-41	Material Handling Fund.....	5	D5	Prin. of Salesmanship.....	2½
IM30-31	Plant Layout.....	5	D8	Sales Management.....	2½
Ec31	Managerial Economics.....	2½	D7	Sales Promotion.....	2½
IM15	Manufac. Mgmt. Seminar...	2½	T1	Transportation Practices...	2½
IM14	Materials Mgmt. Seminar...	2½	OM1	Office Management Practices.	2½
IR2-3	Human Relations.....	5	OM3	Business Org. & Admin.....	2½
OM3	Business Org. & Admin.....	2	D50	Credit Fundamentals.....	2½
Ec4	Finance II.....	2	IR2-3	Human Relations.....	5
			Ec4	Finance II.....	2
Administrative					
Ec12	Government Controls.....	2½	OM3	Business Org. & Admin.....	2½
IR2-3	Human Relations.....	5	D1-2	Distribution, Prin.....	4
In3	Insurance for Mgmt.....	2½	D40	Purchasing.....	2½
IR23	Labor Agreement.....	2½	D50	Credit Fundamentals.....	2½
IR21	Labor Leg. - Union-Mgt. Rel..	2½	OM15	Electronic Data Processes...	2½
Ec31	Managerial Economics.....	2½	OM16	Electronic Data Programming	2½
OM1	Office Management Practices.	2½			

Courses other than those shown above may be taken upon approval of the Dean if they are consistent with the student's educational pattern.



University College

*Combined Programs in
Liberal Arts and Management*

COMBINED PROGRAMS IN LIBERAL ARTS AND MANAGEMENT

Leading to the Degree of Bachelor of Science

There are several areas of employment which require as preparatory training a natural combination of liberal arts with business courses. To meet this need the Evening College of Liberal Arts offers in conjunction with University College a program leading to the degree of Bachelor of Science.

The degree requires satisfactory completion of three years of study in liberal arts (72 semester hours of credit) plus fifty (50) semester hours of credit in management courses. The following programs, as represented in the several options, are designed to provide the most adequate preparation for the specific areas of work.

ADMINISTRATION

Leading to the Degree of Bachelor of Science

*Liberal Arts Courses:		<i>Semester Hours</i>
English	4	
Fine Arts	4	
Government	6	
History	8	
Literature	8	
Philosophy	4	
Psychology	8	
Science	6	
Sociology	6	
Elective Courses	<u>18</u>	72

Management Courses

A30-31	Managerial Accounting	4	
A32	Financial & Administrative Accounting	2½	
D1-2	Principles of Distribution	4	
D40	Purchasing	2½	
D50	Credit Fundamentals	2½	
Ec1-2	Business Economics	4	
Ec3-4	Financing Business Operations	4	
Ec5-6	Financial Policy and Planning	4	
Ec20-21	Management Statistics	4	
Ec34-35	Business Planning and Research	5	
In3	Insurance for Management	2½	
IR20	Labor-Management Relations	2	
L1-2	Legal Aspects of Business I	4	
L3-4	Legal Aspects of Business II	4	
OM1	Office Management Practices	2½	
OM3	Business Organization & Administration	2½	
	Elective Courses	<u>4</u>	58
Total Semester Hours Required for Degree			<u>130</u>

*Courses in the Liberal Arts for this program are taken through evening course offerings in the College of Liberal Arts.

PERSONNEL AND INDUSTRIAL RELATIONS

Leading to the Degree of Bachelor of Science

*Liberal Arts Courses		Semester Hours
English	4	
Fine Arts	4	
Government	6	
History	8	
Literature	8	
Philosophy	4	
Psychology	12	
Science	6	
Sociology	8	
Elective Courses	<u>12</u>	72

Management Courses:

A30-31	Managerial Accounting	4	
A32	Financial & Administrative Accounting	2½	
Ec1-2	Business Economics	4	
Ec3-4	Financing Business Operations	4	
Ec5-6	Financial Policy and Planning	4	
Ec20-21	Management Statistics	4	
IM2	Work Measurements I	2½	
IM7	Job Analysis and Evaluation	2½	
IR4	Personnel Management Practices	2½	
IR6	Employment Testing	2½	
IR7	Practical Training Methods	2½	
IR20	Labor-Management Relations	2	
IR21	Labor Leg.-Union-Mgmt. Relations	2½	
IR22	Labor Leg.-Standards and Conditions	2½	
IR23	Labor Agreement	2½	
L1-2	Legal Aspects of Business I	4	
L3-4	Legal Aspects of Business II	4	
	Elective Courses	<u>5½</u>	58
Total Semester Hours Required for Degree			<u>130</u>

*Courses in the Liberal Arts for this program are taken through evening course offerings in the College of Liberal Arts.

SALES

Leading to the Degree of Bachelor of Science

Liberal Arts CoursesSemester Hours*

English	4	
Fine Arts	4	
Government	6	
History	8	
Literature	8	
Philosophy	4	
Psychology	8	
Science	6	
Sociology	8	
Elective Courses	<u>16</u>	72

Management Courses:

A30-31	Managerial Accounting	4	
D1-2	Principles of Distribution	4	
D5	Principles of Salesmanship	2½	
D7	Sales Promotion	2½	
D10	Market Research	2½	
D20-21	Principles of Advertising	5	
D50	Credit Fundamentals	2½	
Ec1-2	Business Economics	4	
Ec3-4	Financing Business Operations	4	
Ec5-6	Financial Policy and Planning	4	
Ec12	Government Controls	2½	
Ec20-21	Management Statistics	4	
Ec31	Managerial Economics	2½	
L1-2	Legal Aspects of Business I	4	
L3-4	Legal Aspects of Business II	4	
	Elective Courses	<u>6</u>	58
	Total Semester Hours Required for Degree		<u>130</u>

*Courses in the Liberal Arts for this program are taken through evening course offerings in the College of Liberal Arts.

University College

Programs in Law Enforcement and Security

LAW ENFORCEMENT

Leading to the Degree of Bachelor of Science

Course No.	Required Courses Courses	Semester Hours of Credit
E1-2	English and Business Communications	4
E3-4	Business Writing and Reports	4
E-3	*Introduction to Literature	2
	*Literature	4
Ec1-2	Business Economics	4
G1-2	*American Government	4
	†*State and Local Government	2
	*Public Administration	2
	†*American Constitutional Law	2
	†*History of the U. S. to 1876	2
	†*History of the U. S. since 1876	2
	*English Constitutional History	2
Ps1-2	*General Psychology	4
Ps5	*Abnormal Psychology	4
Ps3	*Psychology of Personality	2
S1-2	*Principles of Sociology	4
S13-14	*Juvenile Delinquency	4
S15-16	*Criminology	4
S23	*Race Relations and Culture Contact	2
Sc1-2	*Survey of the Physical and Biological Sciences	6
	†*Mathematics	3

67

Required Professional Courses

LE1	Administration of Justice	2
LE2	Law Enforcement Administration and Management	2½
LE3-4	Police Interrogation	4
LE8	Criminal Law	2½
LE9	Evidence	2
LE7	Police Patrol	2
LE12	Records in Law Enforcement	2
LE13	Criminal Identification	2
LE5-6	Criminal Investigation and Case Preparation	4
LE14	Introduction to Criminalistics	2
LE16	Special Problems in Law Enforcement Administration and Management	2
LE17-18	Investigative Report Writing	4
LE19-20	Police Supervision	4
LE21	Police Public Relations	2
LE22	Police Research Methods	2
LE10-11	Traffic Law Enforcement	4
LE15	Crime Prevention	2

45
112

Elective Courses

Each student enrolled in the law enforcement degree curriculum may choose 18 elective credits. The electives will be chosen after consultation with and approval of the student's academic advisor. The areas of study are as follows: Accounting, Economics, English, Fine Arts, Government, History, Administration and Organization, Human Relations, Law, Mathematics, Modern Languages, Office Management, Psychology, Science, Sociology, Security.

Total Hours Required for Degrees

18
130

*Courses taken through evening offerings in the College of Liberal Arts.

†Courses in preparation.

SECURITY

Leading to the Degree of Bachelor of Science

Required Courses

Course No.	Courses	Semester	Hours of Credit
E1-2	English and Business Communications	4	
E3-4	Business Writing and Reports	4	
E3	*Introduction to Literature	2	
	*Literature	4	
Ecl-2	Business Economics	4	
A30-31	Managerial Accounting	4	
In1-2	Principles of Insurance	5	
In10-11	Fidelity, Suretyship and Crime Insurance	5	
IM13	Industrial Safety	2½	
G1-2	*American Government	4	
	†*American Constitutional Law	2	
	†*Organization for National Security	2	
H23-24	*Russia since 1917	4	
	†*History of the U. S. to 1876	2	
	†*History of the U. S. since 1876	2	
Ps1-2	*General Psychology	4	
Ps3	*Psychology of Personality	2	
S1-2	*Principles of Sociology	4	
S15-16	*Criminology	4	
Sc1-2	*Survey of the Physical and Biological Sciences	6	
	†*Mathematics	3	73½

Required Professional Courses

LE1	Administration of Justice	2	
LE2	Law Enforcement Administration and Management	2½	
LE3-4	Police Interrogation	4	
LE8	Criminal Law	2½	
LE9	Evidence	2	
	Police Patrol	2	
LE10	Traffic Law Enforcement	2	
LE5-6	Criminal Investigation and Case Preparation	4	
LE17-18	Investigative Report Writing	4	
LE22	Police Research Methods	2	
LE23	Survey of Security in American Business and Industry	2	
LE24	Government Security Programs	2	
LE25	Plant Protection	2	
LE26	Industrial Fire Prevention	2	
LE27	Retail Security	2	37
			110½

Elective Courses

Each student enrolled in the security degree curriculum may choose 19½ elective credits. The electives will be chosen after consultation with and approval of the student's academic advisor. The areas of study are as follows: Law, Fine Arts, Mathematics, History, Government, Retailing, Office Management, Industrial Relations, Industrial Management, Modern Languages, Philosophy, Psychology, Sociology, Economics, Insurance, Accounting, English, and Law Enforcement.

Total Hours Required for Degrees

19½
130

*Courses taken through evening offerings in the College of Liberal Arts.

†Courses in preparation.

University College

Institute Programs
Certificates Awarded

Credit and Financial Management Institute

Business Management and the public are becoming increasingly aware of the responsibilities and professional obligations of the credit executive, whose work covers every important area of commercial and industrial activity. Credit dispositions affect the economic, social and moral welfare of peoples of all levels of our national life.

For the persons aspiring to a career in credit management, training on a professional level is a necessity. The program offered in the Credit and Financial Management Institute and through the B.S. Degree Curriculum is designed to qualify credit office personnel and others, whose interests and work are indirectly related to credit functions, for posts of greater responsibility and trust.

The Boston Chapter, National Institute of Credit, co-operates with the University College, Northeastern University, in sponsoring these courses of training. Satisfactory completion of the courses prepares the students for the examination to qualify for the Awards of Associate and Fellow of the National Institute of Credit. Examinations are set and given by the National Institute. Students are asked to consult with the Dean for details of the examinations and awards.

The Certificate Program

The Certificate requires the completion in University College of forty (40) semester hours of credit from courses listed below. Students who can establish proficiency in any of the required courses through practical experience, or who have completed any of them previously in another institution, may substitute other related courses upon approval of the Dean.

Required Courses

<i>Course Numbers</i>	<i>Courses</i>	<i>Semester Hours of Credit</i>
A30-31	Managerial Accounting	4
Ecl-2	Business Economics	4
Ec3-4	Financing Business Operations	4
E10	Effective Speaking for Business	2½
D5	Principles of Salesmanship	2½
D50	Credit Fundamentals	2½
D51	Credit Problems	2½
L1-2	Legal Aspects of Business I	4
L3-4	Legal Aspects of Business II	4

Elective Courses

A34	Analysis of Financial Statements	2½
D1-2	Principles of Distribution	4
D30-31	Foreign Trade	5
D40	Purchasing	2½
Ec5-6	Financial Policy and Planning	4
E1-2	English and Business Communications	4
IR1	Psychology for Business	2½
IR8	Techniques of Supervision	2½
OM1	Office Management Practices	2½

B.S. Degree

Credits earned in any of the above courses may be applied toward the semester hours required for the B.S. degree. Students registering for this program should consult with the Dean to arrange a program of courses which will most adequately satisfy their training needs.

Institute of Distribution

The broad field of distribution represents a facet of our economy which possesses great challenges and opportunities. The serving of current needs and the creation of new markets are fundamental to the welfare and progress of our society. Changes are in constant process in this dynamic field. Some of the major reductions in cost of materials to the consumer demanded by our competitive system will result in the development of more effective procedures requiring highly trained personnel.

The Institute of Distribution represents a program of basic courses for persons employed in as well as for those seeking opportunities in one of its several branches.

The student may enroll for one or more individual courses, complete the requirements of the Certificate Program, or use the credits earned toward the B.S. degree.

The Certificate Program

The Certificate requires the completion in University College of thirty (30) semester hours of credit from courses listed below. Students who can establish proficiency in any of the required courses through practical experience, or who have completed any of them previously in another institution, may substitute other related courses upon approval of the Dean.

Required Courses

<i>Course Numbers</i>	<i>Courses</i>	<i>Semester Hours of Credit</i>
D1-2	Principles of Distribution	4
D-5	Principles of Salesmanship	2½
D20-21	Principles of Advertising	5
T1	Transportation Practices	2½

Elective Courses

D6	Techniques of Salesmanship	2½
D7	Sales Promotion	2½
D8	Sales Management	2½
D9	Sales Executive Training	2½
D10	Market Research	2½
D22	Advertising Problems	2½
D23	Advertising Copy	2½
D25	Advertising Media	2½
D26	Direct Mail Advertising	2½
D40	Purchasing	2½
D41	Consumer Packaging	2½
D50	Credit Fundamentals	2½
D52	Consumer Credit	2½
R1	Retail Store Management	2½
R2	Retail Store Merchandising	2½
R4	Merchandise Display for Sales Promotion	2½
T2	Traffic Management	2½

B.S. Degree

Credits earned in any of the above courses may be applied toward the semester hours required for the B.S. degree. Students registering for this program should consult with the Dean to arrange a program of courses which will most adequately satisfy their training needs.

Institute of Industrial and Commercial Material Handling

Material Handling represents the main frontier in production for cost reduction. The potentials are evident when it is estimated by many authorities that in the average plant —

... 50 tons of material are moved for every ton of finished product

... handling costs up to 25 cents of every manufacturing dollar

... 25% of all industrial accidents are attributable to material handling

The Institute provides a vigorous and forward-looking program of practical training for those currently employed in material handling sales, engineering, administration or other related areas of production and distribution. The program is designed to help meet the need for personnel trained in this important phase of industrial activity.

The student may select an individual course, complete the requirements of the Certificate Program, or use the credits earned toward the B.S. Degree Curriculum in Production Management — Industrial and Commercial Material Handling.

The Certificate Program

The Certificate requires the completion in University College of thirty (30) semester hours of credit from courses listed below. Students who can establish proficiency in any of the required courses through practical experience, or who have completed any of them previously in another institution, may substitute other related courses upon approval of the Dean.

Required Courses

<i>Course Numbers</i>	<i>Courses</i>	<i>Semester Hours of Credit</i>
IM5	Work Simplification I	2½
IM8-9	Production Planning and Control	4
IM40-41	Material Handling Fundamentals	5
IM42	Material Handling — Problem Analysis	2½
IM43	Material Handling — Cost Determination	2½
IM44	Material Handling — Engineering Principles	2½

Elective Courses

A30-31	Managerial Accounting	4
D40	Purchasing	2½
D42	Industrial Packing and Packaging	2½
M2-3	Mathematics	4
IM11	Production Processes	2½
IM13	Industrial Safety	2½
IM30-31	Plant Layout	5
IM45	Material Handling — Conveyorization	2½
IM46	Material Handling — Commercial Carriers	2½
IM47	Material Handling — Industrial Warehousing	2½
IM48	Material Handling — Yard Handling	2½
IM49	Material Handling — In-Process Handling	2½
IM50	Material Handling — Multi-story Buildings	2½
IM51	Material Handling — Bulk Materials	2½

B.S. Degree

Credits earned in any of the above courses may be applied toward the semester hours required for the B.S. degree. Students registering for this program should consult with the Dean to arrange a program of courses which will most adequately satisfy their training needs.

Institute of Insurance

Designed to meet a demand for a practical approach to the basic principles and practices of current procedures and operations in the field of insurance, the Institute of Insurance offers an integrated program of courses, each closely interrelated with the appropriate policy forms, endorsements and manuals.

These courses should prove of especial value to office workers in insurance companies as a preparation for advancement or for those who may be employed as or who plan to train to become agents, brokers, fieldmen or underwriters.

The complete program including thirty (30) semester hours may be completed in two academic years. The courses will include those listed below as required courses, plus other elective courses to make a total of thirty (30) semester hours.

The Certificate Program

The Certificate requires the completion in University College of thirty (30) semester hours of credit from courses listed below. Students who can establish proficiency in any of the required courses through practical experience, or who have completed any of them previously in another institution, may substitute other related courses upon approval of the Dean.

Required Courses

<i>Course Numbers</i>	<i>Courses</i>	<i>Semester Hours of Credit</i>
In1-2	Insurance Principles	5
In4-5	Casualty Insurance	5
In6-7	Fire and Allied Lines	5
In8-9	Inland Marine Insurance	5
In10-11	Fidelity, Suretyship and Crime	5

Elective Courses

A30-31	Managerial Accounting	4
D5	Principles of Salesmanship	2½
Ec1-2	Business Economics	4
Ec3-4	Financing Business Operations	4
Ec20-21	Management Statistics	4
E10	Effective Speaking for Business	2½
IM13	Industrial Safety	2½
In13-14	Claims Procedure	5
L1-2-3-4	Legal Aspects of Business I-II	8

B.S. Degree

Credits earned in any of the above courses may be applied toward the semester hours required for the B.S. degree. Students registering for this program should consult with the Dean to arrange a program of courses which will most adequately satisfy their training needs.

Institute of Retailing

Rapid changes have come about in the distribution of merchandise. This is especially true in the retail store phase of the field. During recent years, many factors such as rapidity of style changes, the increase in size of retail stores and the keenness of competition have helped to make the management of a retail business more complex and difficult. Progressive stores have already done considerable in the nature of applying the scientific approach to some of these problems. In such a fast moving field, the store management is constantly in search of those who are qualified through adequate training and experience to assume responsibility and authority.

The courses included in the Institute of Retailing are designed to provide an integrated program of study for men and women who desire to train for positions of managerial responsibility in the field of retailing. Students may register for single courses or for the complete programs.

The Certificate Program

The Certificate requires the completion in University College of thirty (30) semester hours of credit from courses listed below. Students who can establish proficiency in any of the required courses through practical experience, or who have completed any of them previously in another institution, may substitute other related courses upon approval of the Dean.

Required Courses

<i>Course Numbers</i>	<i>Courses</i>	<i>Semester Hours of Credit</i>
D1-2	Principles of Distribution	4
D5	Principles of Salesmanship	2½
D20-21	Principles of Advertising	5
D52	Consumer Credit	2½
Ec1-2	Business Economics	4
Ec20	Management Statistics	2
R1	Retail Store Management	2½
R2	Retail Store Merchandising	2½
R3	Retail Store Advertising	2½
R4	Merchandise Display for Sales Promotion	2½

B.S. Degree

Credits earned in any of the above courses may be applied toward the semester hours required for the B.S. degree. Students registering for this program should consult with the Dean to arrange a program of courses which will most adequately satisfy their training needs.

Institute of Transportation and Traffic Management

Transportation as a phase of the distribution of raw materials and processed merchandise is assuming a degree of major importance in our American economy. The flexibility of the trucking industry is changing many of our concepts of inventories and methods of operation. This, plus the cost factor, requires effective management of the handling and shipment of goods.

Two standards of professional achievement exist today in the field of Transportation and Traffic Management. One is admission to practice before the bar of the Interstate Commerce Commission; the other is admission to the American Society of Traffic and Transportation, Inc. Examinations for the former are given twice yearly by the Interstate Commerce Commission. Successful completion of the examination qualifies one to present cases and represent clients before the Commission. Examinations for the latter are announced periodically by the association. Successful completion of the examination carries with it a certificate of accomplishment that is very highly regarded in the fields of Transportation and Traffic Management.

The Institute program outlined below is designed to accomplish two objectives: (1) Provide an intensive training in the fields of Transportation and Traffic Management, as well as a supplementary background in the broader aspects of business administration; (2) prepare individuals specifically for the two examinations discussed above. The courses marked with an asterisk (*) are those most necessary for this preparation.

The Certificate Program

The Certificate requires the completion in University College of thirty (30) semester hours of credit from courses listed below. Students who can establish proficiency in any of the required courses through practical experience, or who have completed any of them previously in another institution, may substitute other related courses upon approval of the Dean.

Required Courses

Course Numbers	Courses	Semester Hours of Credit
T1	Transportation Practices	2½
T2	*Traffic Management	2½
T3	*Advanced Traffic Management Problems	2½
T9-10	*I.C.C. Practices and Procedures	5
T13	*Freight Claims for Loss and Damage	2½
T14-15	*Rates and Tariffs	5

Elective Courses

D42	Industrial Packaging and Packing	2½
Ec1-2	*Business Economics	4
Ec12	*Government Controls in Business	2½
L1-2-3-4	Legal Aspects of Business I-II	8
T4	Selling Transportation Services	2½
T5	Ocean Transportation	2½
T6	Air Transportation	2½
T7	Transportation Insurance	2½
T11	Motor Carrier Operations	2½
T12	Motor Carrier Traffic Management	2½
T16	Commercial Warehousing	2½
T17	*Transportation Economics	2½

B.S. Degree

Credits earned in any of the above courses may be applied toward the semester hours required for the B.S. degree. Students registering for this program should consult with the Dean to arrange a program of courses which will most adequately satisfy their training needs.

Labor Relations Institute

The management of labor relations presents the most vital and challenging aspect of our industrial development of the immediate future. Continuance of our American way of industrial democracy demands a harmonious understanding of the underlying principles of labor and industrial management for the peaceful adjustment of their common problems.

The Labor Relations Institute of Northeastern University was organized to serve this need. It is dedicated to the service of both labor and management. It directly concerns the work of industrial and labor executives, plant managers, personnel directors, union shop counsellors and stewards.

Students may register for the complete program or may take any one or more of the courses which serve their particular needs. They may complete the entire program by attending three evenings per week for two years. Each individual course is one semester or sixteen weeks in length and carries either two or one-half semester hours of credit for students qualified for the degree programs of University College.

The Certificate Program

The Certificate requires the completion in University College of thirty (30) semester hours of credit from courses listed below. Students who can establish proficiency in any of the required courses through practical experience, or who have completed any of them previously in another institution, may substitute other related courses upon approval of the Dean.

Required Courses

<i>Course Numbers</i>	<i>Courses</i>	<i>Semester Hours of Credit</i>
Ec1-2	Business Economics	4
IR20	Labor-Management Relations	2
IR21	Labor Legislation — Union-Management Relations	2½
IR22	Labor Legislation — Standards and Conditions	2½
IR23	Labor Agreement — Negotiation and Administration	2½
IR24	Labor Relations Seminar	2½

Elective Courses

A30-31	Managerial Accounting	4
E10	Effective Speaking for Business	2½
E12	Business Conferences	2½
IM2	Work Measurements I	2½
IM3	Work Measurements II	2½
IM5	Work Simplification I	2½
IM6	Work Simplification II	2½
IM7	Job Analysis and Evaluation	2½
IM13	Industrial Safety	2½
IR1	Psychology for Business	2½
IR2-3	Human Relations	5
IR4	Personnel Management Practices	2½
IR5	Wage Administration	2½
IR6	Employment Testing	2½
IR7	Practical Training Methods	2½

B.S. Degree

Credits earned in any of the above courses may be applied toward the semester hours required for the B.S. degree. Students registering for this program should consult with the Dean to arrange a program of courses which will most adequately satisfy their training needs.

Office Management Institute

The profession of office management has developed rapidly in scope and status in response to the technical and diversified nature of the problems arising and the current trends toward the scientific approach to the solutions of these problems. Heretofore, the efforts toward simplified work procedures have been related primarily to the plant ends of production. Its extension to office procedures is vital to the necessary reduction of the ever-mounting overhead created by increased costs.

The Office Management Institute is designed to serve those already employed in the field by providing instruction necessary for simplification and standardization of their operational tasks. The courses should have an appeal for systems analysts, accountants, office managers, sales managers, engineers, comptrollers, etc. It also provides a formal and planned program of training for those intending to make their careers in this profession.

University College co-operates with the National Office Management Association in offering programs of study leading to the Associate and Fellow Certificates in Management of Office Administrative Services awarded by the National Office Management Association. Students are asked to consult with the Dean for details of the two programs.

The student may select an individual course, complete the requirements of the Certificate Program or use the credits earned toward the B.S. degree.

The Certificate Program

The Certificate requires the completion in University College of thirty (30) semester hours of credit from courses listed below. Students who can establish proficiency in any of the required courses through practical experience, or who have completed any of them previously in another institution, may substitute other related courses upon approval of the Dean.

Required Courses

<i>Course Numbers</i>	<i>Courses</i>	<i>Semester Hours of Credit</i>
A30-31	Managerial Accounting	4
IR8	Techniques of Supervision	2½
OM1	Office Management Practices	2½
OM2	Scientific Management in Office Practice	2½
OM10	Office Systems and Procedure	2½
OM11	Forms Design and Control	2½

Elective Courses

A37	Punch Card Accounting	2½
Ec20-21	Management Statistics	4
E1-2	English and Business Communications	4
E12	Business Conferences	2½
IR2-3	Human Relations	5
IR5	Wage Administration	2½
IR6	Employment Testing	2½
IR7	Practical Training Methods	2½
IR20	Labor-Management Relations	2
OM12	Systems Analysis and Improvement	2½
OM15	Electronic Data Processing Systems	2½

B.S. Degree

Credits earned in any of the above courses may be applied toward the semester hours required for the B.S. degree. Students registering for this program should consult with the Dean to arrange a program of courses which will most adequately satisfy their training needs.

Production Management Institute

The Production Management Institute presents an integrated program of courses for those specifically related to or interested in the plant ends of manufacturing. With each course designed to treat the subject matter in detail and thereby stand alone as a unit, the program achieves integration by the use of projects which carry through the several courses in sequence, developing a complete picture of the methods and procedure encountered in the over-all practical problems of production. This integration makes possible the thorough study of a highly technical field with limitless detail which otherwise could be approached only in a superficial manner.

This program should have direct value to those currently employed in one of the several operating manufacturing departments as well as those who wish to plan for careers in this area of management.

The student may select an individual course, complete the requirements of the Certificate Program or use the credits earned toward the B.S. degree.

The Certificate Program

The Certificate requires the completion in University College of thirty (30) semester hours of credit from courses listed below. Students who can establish proficiency in any of the required courses through practical experience, or who have completed any of them previously in another institution, may substitute other related courses upon approval of the Dean.

Required Courses

<i>Course Numbers</i>	<i>Courses</i>	<i>Semester Hours of Credit</i>
A30-31	Managerial Accounting	4
M2-3	Mathematics	4
IM5	Work Simplification I	2½
IM8-9	Production Planning and Control	4
IM11	Production Processes	2½
IM12	Estimating for Production	2½

Elective Courses

Ec20	Management Statistics	2
IM2	Work Measurements I	2½
IM4	Synthetic Time Standards — M.T.M.	2½
IM6	Work Simplification II	2½
IM7	Job Analysis and Evaluation	2½
IM10	Materials of Production	2½
IM13	Industrial Safety	2½
IM20	Quality Control	2
IM30-31	Plant Layout	5
IM40-41	Material Handling Fundamentals	5
IM42	Material Handling Problems	2½
IR2-3	Human Relations	5
IR7	Practical Training Methods	2½
IR8	Techniques of Supervision	2½
IR20	Labor-Management Relations	2
IR23	Labor Agreement — Negotiations and Administration	2½

B.S. Degree

Credits earned in any of the above courses may be applied toward the semester hours required for the B.S. degree. Students registering for this program should consult with the Dean to arrange a program of courses which will most adequately satisfy their training needs.

Quality Control Institute

The application of statistical methods to the control of quality — a comparatively new management tool — has produced significant results in:

- Improved quality of manufactured product
- Increased productivity of labor and machines
- Reduction in scrap, rework, tool and machine down-time costs
- Decrease in rejects
- Increased effectiveness of supervision
- Improved quality of purchased materials
- Providing of scientific analysis of product specification

Quality Control has effective application to both large and small organizations. It warns when trouble is imminent and tells where and when to look for the source of the trouble. It indicates when a process should be changed for increased economy. By appropriate sampling techniques it provides a constant control of materials used, the production processes and the inspection of the final product, resulting in reduction of costs and the production of a higher percentage of acceptable units.

The courses are designed to serve persons specializing in *Quality Control* or those wishing to include it in the Degree Program in Production Management.

The Certificate Program

The Certificate requires the completion in University College of thirty (30) semester hours of credit from courses listed below. Students who can establish proficiency in any of the required courses through practical experience, or who have completed any of them previously in another institution, may substitute other related courses upon approval of the Dean.

Required Courses

<i>Course Numbers</i>	<i>Courses</i>	<i>Semester Hours of Credit</i>
Ec20	Management Statistics	2
M2-3	Mathematics	4
IM10	Materials of Production	2½
IM20	Quality Control	2
IM21	Advanced Quality Control	2½
IM22	Management of Quality Control	2½
IM23	Quality Control Seminar	2½
IM32	Industrial Experimentation I	2½

Elective Courses

M4-5	Graphic and Mathematical Techniques in Industry	4
IM5	Work Simplification I	2½
IM6	Work Simplification II	2½
IM8-9	Production Planning and Control	4
IM11	Production Processes	2½
IR1	Psychology for Business	2½
IR8	Techniques of Supervision	2½

B.S. Degree

Credits earned in any of the above courses may be applied toward the semester hours required for the B.S. degree. Students registering for this program should consult with the Dean to arrange a program of courses which will most adequately satisfy their training needs.

Real Estate Institute

The social and economic importance of real estate has been impressed upon us since World War II. Conditions in the field have changed rapidly since that time to the extent that real estate is no longer a local phenomenon but rather a national problem. It becomes increasingly important, therefore, that persons be trained in the economics as well as the legal and financial problems for either personal use or for operational purposes as brokers, financiers, managers, investors or land planners.

The courses comprising the Institute of Real Estate are designed as practical tool courses for those training for or directly associated with concerns actively engaged in real estate ownership, conveyancing and management as lawyers, real estate agents and brokers, property managers, conveyancers, builders, municipal land planners or employees of banks, insurance companies and other financial institutions with major investments in real estate.

The Certificate Program

The Certificate requires the completion in University College of thirty (30) semester hours of credit from courses listed below. Students who can establish proficiency in any of the required courses through practical experience, or who have completed any of them previously in another institution, may substitute other related courses upon approval of the Dean.

Required Courses

<i>Course Numbers</i>	<i>Courses</i>	<i>Semester Hours of Credit</i>
A30-31	Managerial Accounting	4
RE1	Real Estate Fundamentals	2½
RE2	Real Estate Law and Conveyancing	2½
RE3	Real Estate Management	2½
RE4	Real Estate Finance	2½
RE5	Real Estate Sales and Advertising	2½
RE6	Operating a Real Estate Business	2½
RE7	Real Estate Appraisal — Residential	2½
RE8	Real Estate Appraisal — Commercial and Industrial	2½

Elective Courses

D1-2	Principles of Distribution	4
D5	Principles of Salesmanship	2½
D20-21	Principles of Advertising	5
Ec1-2	Business Economics	4
Ec20-21	Management Statistics	4
E10	Effective Speaking for Business	2½
L1-2-3-4	Legal Aspects of Business I-II	8
RE9	Small Home Construction and Estimating	2½

B.S. Degree

Credits earned in any of the above courses may be applied toward the semester hours required for the B.S. degree. Students registering for this program should consult with the Dean to arrange a program of courses which will most adequately satisfy their training needs.

University College

Programs for Administrative Secretaries

Institute for Business and Professional Secretaries

Today, more than ever, with the increased tempo of modern production, business and industry are looking toward qualified women to assume positions of administrative responsibility. To meet these needs women with secretarial training may supplement this background with further knowledge and information through professional courses related to the operations of their respective departments or organizations. The combination of proficiency in the secretarial sciences with training through specialized courses related to their fields of employment considerably enhances their value and provides the avenue for advancement into positions of major importance with higher salaries. For those who have not had previous instruction in secretarial science, such courses will be included in their programs. Advanced standing credit, up to a maximum of fifteen (15) semester hours, may be awarded to those who have satisfactorily completed courses elsewhere and/or can achieve satisfactory performance in the secretarial sciences through proficiency examinations.

Students may register for individual courses, complete the requirements of forty-five (45) semester hours for the Certificate or apply the credits earned toward the B.S. degree.

The program for each student will be recommended and planned on an individual conference basis. In each case, however, there will be a core of basic required courses which will be supplemented by elective courses selected to serve most adequately the student's specific needs. Each student must have completed a basic course in Shorthand and Typewriting at an approved school as a requirement of admission to this Institute program. Certain suggested programs are outlined below.

Required Courses

Course No.		Semester Hours	Course No.		Semester Hours
A30-31	Managerial Accounting.	4	E3-4	Bus. Writing and Reports . .	4
Ec1-2	Business Economics.	4	IR1	Psychology for Business. . . .	2½
E1-2	English and Bus. Comm.	4	OM1	Office Mgmt. Practices.	2½
			OM2	Scientific Mgmt. in Off. Prac.	2½

Suggested Electives in Specialized Areas

Accounting

A32	Fin. and Adm. Acct.	2½
A33	Mgrl. Cost Controls.	2½
A50-51	Basic Federal Taxes.	5
Ec3-4	Financing Bus. Operations .	4
Ec12	Government Controls.	2½
L1-2-3-4	Legal Aspects of Bus. I-II. . .	8

Credit Management

A34	Anal. Fin. Statements.	2½
D50	Credit Fundamentals.	2½
D51	Credit Problems.	2½
D52	Consumer Credit.	2½
Ec3-4	Financing Bus. Operations .	4
Ec5-6	Fin. Pol. & Planning.	4
L1-2-3-4	Legal Aspects of Bus. I-II. . .	8

Advertising

D1-2	Principles of Distribution. . .	4
D5	Principles of Salesmanship .	2½
D7	Sales Promotion.	2½
D10	Market Research.	2½
D20-21	Prin. of Advertising.	5
D23	Advertising Copy.	2½
D24	Advertising Production. . . .	2½
D25	Advertising Media.	2½
D41	Consumer Packaging.	2½
R3	Retail Store Advertising. . . .	2½
R4	Merchandise Display.	2½

Finance

A34	Anal. Fin. Statements.	2½
Ec3-4	Fin. Business Operations. . .	4
Ec5-6	Fin. Policy & Planning. . . .	4
Ec7	Investment Principles.	2½
Ec20-21	Management Statistics.	4
Ec32	Monetary Policy.	2½
Ec34-35	Business Plng. & Research. .	5

Engineering

Ec20	Management Statistics.	2
M2-3	Mathematics.	4
IM5	Work Simplification I.	2½
IM8-9	Prod. Planning Control. . . .	4
IM10	Matls. of Prod.	2½
IM11	Production Processes.	2½
IM20	Quality Control.	2

Foreign Trade

D1-2	Principles of Distribution. . .	4
D10	Market Research.	2½
D30-31	Foreign Trade.	5
Ec3-4	Fin. Business Operations. . .	4
Ec11	Economic Geography.	2½
Ec20-21	Management Statistics.	4
Ec30	International Economics. . .	2½
L1-2-3-4	Legal Aspects of Bus. I-II. . .	8

Course No.	Semester Hours
Insurance	
Ec20-21 Management Statistics.....	4
In1-2 Insurance Principles.....	5
In4-5 Casualty Insurance.....	5
In6-7 Fire and Allied Lines.....	5
In8-9 Inland Marine.....	5
In10-11 Fidelity, Surety & Crime Ins.	5
In13-14 Claims Procedure.....	5
IR2-3 Human Relations.....	5
L1-2-3-4 Legal Aspects of Bus. I-II...	8

Law

A50-51 Basic Federal Taxes.....	5
Ec12 Government Controls.....	2½
L1-2-3-4 Legal Aspects of Bus. I-II...	8
RE1 Real Estate Fundamentals...	2½
RE2 R.E. Law & Convey.....	2½

Office Management

D40 Purchasing.....	2½
D50 Credit Fundamentals.....	2½
IM7 Job Analysis and Evaluation	2½
IR2-3 Human Relations.....	5
IR6 Employment Testing.....	2½
IR7 Practical Training Methods.	2½
IR8 Techniques of Supervision.	2½
OM1 Office Mgmt. Practices.....	2½
OM10 Office Systems & Procedures	2½
OM11 Forms Design.....	2½

Personnel and Industrial Relations

Ec20-21 Management Statistics.....	4
IM2 Work Measurements I.....	2½
IM7 Job Analysis and Evaluation	2½
In4-5 Casualty Insurance.....	5
IR2-3 Human Relations.....	5
IR4 Personnel Mgmt. Practices..	2½
IR5 Wage Administration.....	2½
IR6 Employment Testing.....	2½
IR7 Practical Training Methods.	2½
IR20 Labor-Mgmt. Relations.....	2½
IR21 Labor Leg., Un.-Mgmt. Rel..	2½
IR22 Lab. Leg., Stds. & Cond. ...	2½

Production

D40 Purchasing.....	2½
M2-3 Mathematics.....	4
IM2 Work Measurements I.....	2½
IM5 Work Simplification I.....	2½
IM7 Job Analysis and Evaluation	2½
IM8-9 Production Plng. & Control	4
IM10 Mats. of Prod.....	2½
IM11 Production Processes.....	2½
IM13 Industrial Safety.....	2½
L1-2-3-4 Legal Aspects of Bus. I-II...	8

Course No.	Semester Hours
Purchasing	
D5 Principles of Salesmanship...	2½
D30-31 Foreign Trade.....	5
D40 Purchasing.....	2½
Ec20-21 Management Statistics.....	4
IM10 Mats. of Prod.....	2½
IM11 Production Processes.....	2½
IM20 Quality Control.....	2½
L1-2-3-4 Legal Aspects of Business...	8

Real Estate

Ec3-4 Fin. Business Operations...	4
In4-5 Casualty Insurance.....	5
In6-7 Fire and Allied Lines.....	5
L1-2-3-4 Legal Aspects of Bus. I-II...	8
RE1 Real Estate Fundamentals...	2½
RE2 Real Estate Law & Convey.	2½
RE3 R.E. Investment & Mgmt...	2½
RE4 Real Estate Finance.....	2½
RE5 R.E. Selling and Advertising	2½
RE6 Operating a R.E. Business...	2½
RE7 R.E. Appraisal—Residential	2½
RE8 R.E. Appraisal—Commercial.	2½

Retailing

D1-2 Principles of Distribution...	4
D5 Principles of Salesmanship.	2½
D52 Consumer Credit.....	2½
IR2-3 Human Relations.....	5
IR7 Practical Training Methods.	2½
R1 Retail Store Management...	2½
R2 Retail Store Merchandising.	2½
R3 Retail Store Advertising....	2½
R4 Merchandise Display.....	2½

Sales

D1-2 Principles of Distribution...	4
D5 Principles of Salesmanship.	2½
D7 Sales Promotion.....	2½
D8 Sales Management.....	2½
D10 Market Research.....	2½
D20-21 Principles of Advertising...	5
D23 Advertising Copy.....	2½
D24 Advertising Production....	2½
D25 Advertising Media.....	2½
D41 Consumer Packaging.....	2½
D50 Credit Fundamentals.....	2½
Ec20-21 Management Statistics.....	4
L1-2-3-4 Legal Aspects of Bus. I-II...	8

Transportation & Traffic Management

In4-5 Casualty Insurance.....	5
In8-9 Inland Marine Insurance...	5
L1-2-3-4 Legal Aspects of Bus. I-II...	8
T1 Transportation Practices...	2½
T2 Traffic Management.....	2½
T9-10 I.C.C. Prac. & Proced.....	5
T11 Motor Carrier Operations..	2½
T14-15 Rates and Tariffs.....	5

<i>Course No.</i>		<i>Semester Hours</i>	<i>Course No.</i>		<i>Semester Hours</i>
Sales			Sales		
A30-31	Managerial Accounting . . .	4	D7	Sales Promotion	2½
Ec1-2	Business Economics	4	D8	Sales Management	2½
Ec3-4	Financing Bus. Operations .	4	D10	Market Research	2½
Ec5-6	Financial Policy & Planning	4	D20-21	Principles of Advertising . .	5
Ec20-21	Management Statistics	4	D40	Purchasing	2½
D1-2	Principles of Distribution . .	4	D41	Consumer Packaging	2½
D5	Principles of Salesmanship . .	2½		Elective	14

Courses other than those shown under the options may be taken upon approval of the Dean if they conform to the student's need. Special programs will be arranged to meet specific needs of students.

University College

Description of Courses

THE UNIVERSITY reserves the right to withdraw, modify or add to the courses offered, or to change the order of courses in curricula as may seem advisable.

The University further reserves the right to withdraw in any year any elective or special course for which less than twelve enrollments have been received. Regular students so affected by such withdrawal will be permitted to choose some other course. In the case of special students, a full refund of all tuition and other fees will be made.

The University also reserves the right to change the requirements for graduation, tuition and fees charged, and other regulations. However, no change in tuition and fees at any time shall become effective until the school year following that in which it is announced.

All full-year courses are numbered with a double consecutive number and all half-year courses with a single number. The letter or letters immediately preceding the numbers indicate the classification of the course. The prerequisites for any course are indicated and enrollment in any course is predicated on having met or completed the requirements stated.

Credit for a full-year course is contingent upon satisfactory completion of both semesters.

Credit for one-half of a full-year course is given only upon approval by the Dean.

ACCOUNTING (A)

Applicants for admission to the College who have had experience in accounting or bookkeeping or who have pursued systematic courses in institutions of less than college grade may take an examination for placement purposes in Introductory Accounting. Those who pass this examination will be admitted to Intermediate Accounting and may substitute an elective course in lieu of Introductory Accounting.

A 1-2 INTRODUCTORY ACCOUNTING

This course provides basic instruction for those who plan to specialize in accounting or for those who wish to enroll later for more advanced courses. Emphasis is placed upon proprietorship accounts, including books of entry, statements, business practices, adjustments and an introduction to partnership accounts. Drill and practice work are required for proficient handling of simple accounting transactions.

(No previous knowledge of bookkeeping or accounting necessary)

4 semester hours credit

CORE COURSE for students in Accounting Curricula

A 3-4 INTERMEDIATE ACCOUNTING

A continuation of Introductory Accounting, treating with problems of the partnership and corporate forms of business entities. Accounts for a manufacturing business are introduced. In addition to the drill and practice work on accounting technique, a mastery of many accounting principles is required.

(Prerequisite, A 1-2)

4 semester hours credit

A 5-6 ACCOUNTING PROBLEMS

This course is designed to develop the student's reasoning power and his ability to apply the proper accounting principles in solving a specific problem. Emphasis is placed on principles and their application rather than on individual situations. Subjects covered are the preparation of financial statements, accounting for and valuation of cash items, receivables, inventories, liabilities and net worth accounts. Capital stock, treasury stock and surplus are discussed in detail.

(Prerequisite, A 3-4)

5 semester hours credit

A 7-8 ADVANCED ACCOUNTING PROBLEMS

This course is designed primarily to meet the requirements of students intending to enter the accounting profession. Application of accounting principles to special situations such as partnerships, insolvent companies, estates and trusts, installment sales and consignments. Considerable time is spent on preparation of consolidated statements.

(Prerequisite, A 5-6)

5 semester hours credit

A 9-10 C.P.A. PROBLEMS

A complete review of the theories encountered in A 5, 6, 7, 8, 14, 15, 50, 51. This course is primarily for students intending to take the state C.P.A. examinations. Considerable practice is required, using largely problems from previous C.P.A. examinations. Emphasis is placed on the technique of adequate problem solutions. One feature of the course is a series of three-hour practice C.P.A. examinations held every third week throughout the course.

(Prerequisites, A 7-8; 11; 14-15; 18-19; 50-51)

10 semester hours credit

A 11 FUND ACCOUNTING

The concept of "fund" accounting finds its application in the accounting procedures of governmental units, charities, and educational institutions. This course deals with segregation of assets and liabilities into funds and self-balancing groups required by the organization of non-profit enterprises.

Integrated into the principles of funds is the treatment of accounting controls necessitated by governmental approaches or budgets.

(Prerequisite, A 5-6)

2½ semester hours credit

A 12 CONSTRUCTIVE ACCOUNTING

To acquaint students with the principles underlying the construction of accounting systems and the procedure of system installation. The course is developed by means of problem projects beginning with an analysis of the accounting needs of a small business. By gradual steps increasingly larger businesses are studied and accounting systems developed to meet their needs. Special attention is given accounting records in relation to the expansion of the accounting system.

(Prerequisite, A 5-6)

2½ semester hours credit

A 13 MATHEMATICS OF ACCOUNTING

Mathematical computations required in business practice and in C.P.A. examinations are covered. Considerable practice material is assigned to develop facility and accuracy in mathematics.

Arithmetical computations: Percentages, averages, interest, discounts, partial payments, installment sales, valuation of good will, logarithms, depreciation, gross profit.

Algebraic computations: Tax and bonus problems, determination of net worth of inter-owned companies.

Actuarial science: Compound interest, compound amounts and present values; ordinary annuities and annuities due; sinking fund computations; debt amortizations; effective interest on bonds.

(Prerequisite, A 5-6)

2½ semester hours credit

A 14-15 COST ACCOUNTING

Acquaints the student with the relationship of cost accounting to management and administration control and shows how adequate cost systems may further the intelligent management of business enterprises. Job order, process, and standard cost systems and their integration into the general accounting system of the business are studied. Numerous problems and sets serve as the basis for a study of the various accounts, records, systems, and methods commonly used in modern cost accounting.

(Prerequisite, A 5-6)

5 semester hours credit

A 16-17 ADVANCED COST ACCOUNTING

Intended only for the student who desires to enter the field of cost accounting, this course presents advanced situations and the more intricate problems encountered in cost accounting for specialized businesses. Included in the course is a thorough study of distribution and administrative costs. Each topic is approached from the point of view of what management may expect and the use to which cost information may be put.

(Prerequisite, A 14-15)

5 semester hours credit

A 18-19 AUDITING

This course is offered primarily for students who intend to enter Public Accounting. It covers both theory and practice of auditing with emphasis on statement presentation and internal control. Procedures employed in balance sheet audits in verifying cash, receivables, inventories, investments, plant assets, intangibles, deferred charges, liabilities, capital, income and expense accounts are covered.

Attention is given to pronouncements, research bulletins and statements on auditing procedure issued by the American Institute of Certified Public Accountants. Co-ordinated with the study of auditing principles and procedures is a practice audit simulating the work of public accountants and the entire work of the course is summarized in an audit report prepared toward the end of the course.

(Prerequisite, A 5-6) (Required of Public Accounting students only)

5 semester hours credit

A 20-21 INTERNAL AUDITING

This course covers both basic auditing theory and a study of the function of the internal audit as an independent appraisal activity within an organization for the review of accounting, financial and other operations as a basis for service to management. All balance sheet items are reviewed as to audit verification procedures and internal control standards. In addition, audit of non-accounting functions such as sales, billing, purchases and inventory control are covered. Statistical sampling, audit working papers, written audit reports and other tools of the internal auditor are studied. Case problems in internal auditing and control are discussed in class. Attention is given to statements and bulletins issued by The American Institute of Certified Public Accountants and the Institute of Internal Auditors. Accounting theory is discussed where necessary to clarify auditing procedures.

(Prerequisite, A 5-6) (Required of Commercial and Cost Accounting students)

5 semester hours credit

A 30-31 MANAGERIAL ACCOUNTING

A study of the broad background of accounting and business transactions as a basis for preparing the student to analyze and interpret intelligently financial statements and other accounting reports. Topics covered are the development of accounting fundamentals, accounts for the proprietorship, partnership, and corporate forms of business organization, and preparation of financial statements.

4 semester hours credit

CORE COURSE for students in Non-Accounting Curricula

A 32 FINANCIAL AND ADMINISTRATIVE ACCOUNTING

This is a management approach (for non-accounting majors) to various aspects of control exercised through budgetary procedures, the analysis and interpretation of financial statements, and other accounting reports as they relate to operation and the formulation of business policies.

(Prerequisite, A 30-31)

2½ semester hours credit

A 33 MANAGERIAL COST CONTROLS

Increasing emphasis on the cost factors of production and distribution necessitates a fundamental knowledge of cost procedures on the part of every student training for management responsibilities. This course is designed to provide a practical coverage of basic cost procedures related to materials, labor and manufacturing expense control, and their integration with general manufacturing accounts.

(Prerequisite, A 30-31)

2½ semester hours credit

A 34 ANALYSIS OF FINANCIAL STATEMENTS

This course embodies a study of the techniques used by management, creditors, investors and regulatory authorities in the analysis and interpretation of financial statements for the purpose of establishing credit ratings, determining the investment value of a business, testing the efficiency of operations, and determining whether financial and operating policies, methods, and practices should be continued or changed. The student's ability to analyze, question, determine significant omissions, to criticize constructively, and to distinguish between inferences and facts is developed by extensive use of published corporate reports. The companies selected for study are in industries important to the New England economy such as transportation, power, fuels, lumber, merchandising, textiles, electronics, machinery, paper, shoes, etc.

(Prerequisites, A 5-6 or 30-31, 32)

2½ semester hours credit

A 35-36 CONTROLLERSHIP

Most of the first semester of this course is devoted to the budgeting activities of the controller. Procedures and techniques used in preparing a comprehensive budget are discussed and illustrated by the compilation of a master budget plan from sales, production, manufacturing, selling and administrative expenses through the balance sheet and profit and loss statement. A comparison of the budget and actual financial statements is prepared.

Following this, the course covers the functions and organization of the controller's department, basic techniques employed by the controller, the interpretation of historical results and their co-ordination into the broad policy-making program of the business. The technical phases of the controller's work are covered as preparation for the study of his role as reporter, adviser, and counsellor to business management at all executive levels.

(Prerequisites, A 5-6 or 30-31, 32)

5 semester hours credit

A 37 PUNCH CARD ACCOUNTING

Designed to give accountants, methods men, and executives a working knowledge of punch card accounting, this course offers a comprehensive coverage of available equipment and of installation and operational techniques. Included are working demonstrations of International Business Machines, Remington-Rand, and Underwood-Samas machines; discussion of basic machine functions and methods designed to produce economical and efficient use of such equipment. The subjects covered include card and forms design; preparation of operating manuals; accounting room layout and work scheduling; a detailed presentation of payroll application, inventory and material, commodity billing, accounts payable, accounts receivable, plant and equipment, and bank deposit accounting.

(Prerequisite, A 3-4 or 30-31)

2½ semester hours credit

A 50-51 BASIC FEDERAL TAXES

An introductory study of the Federal Income Tax Law and its application to the income of individuals, partnerships, and corporations, including filing requirements; taxable income, allowable deduction, gains and losses on sales or exchanges; dividends and stock rights; net operating losses; types and preparation of returns.

(Prerequisite, A 3-4 or 30-31)

5 semester hours credit

A 52-53 ADVANCED FEDERAL TAXES

This course involves a detailed study and analysis of leading court cases. It will help the student to obtain a knowledge and understanding of court and treasury reasoning which define and interpret the Internal Revenue Code and its regulations. The history and development of changes affecting important principles and phases of taxation are discussed, replete with illustrations and examples. The objective is to enable the student independently to apply the principles and theory learned to problems arising in his own business or personal practice.

(Prerequisite, A 50-51)

5 semester hours credit

DISTRIBUTION AND MARKETING (D)

Marketing enters into and influences every field of business and includes not only the direct process of the sale of goods, but the whole organization by which goods find their way from the original producer to the ultimate consumer. The change in the economic structure during the past ten years, growing out of higher standards of living, the development of new occupational interests and the shift of population to large cities, has tended to increase the cost of marketing of goods. Just as the elimination of waste in production was the keynote of business fifteen years ago, the reduction of expense and the introduction of more efficient methods in distribution are the foremost thought of business leaders today. For this reason courses in marketing form one of the basic elements in a business education.

D 1-2 PRINCIPLES OF DISTRIBUTION

This course is designed to study the field of distribution as one of the major elements in the management of any business. Broad in scope, through the management approach it is concerned with the economic and sociological aspects of marketing a product or service from the producer to the ultimate consumer, exploring all of the interrelated factors and management tools involved in the various channels and processes.

CORE COURSE (Prerequisite Ec 1-2)

4 semester hours credit

D 5 PRINCIPLES OF SALESMANSHIP

The one all-important aspect of successful salesmanship — an understanding of people, without which any sales technique becomes routine and ineffective. Based upon what makes people behave like human beings, it analyzes the basic needs, desires, tastes, habits that motivate them into buying; their individual differences — the secret to the art of selling (finding that all-important point of contact); the art of allowing people to sell themselves; factors which turn refusals into sales. A course for the veteran or the beginner.

2½ semester hours credit

D 6 TECHNIQUES OF SALESMANSHIP

A techniques course operated on the laboratory-lecture method in which psychological principles are applied to the basic aspects of selling.

The student learns through visual aids, role-playing techniques, student demonstrations using modern effective equipment and techniques, guest lecturers, etc., the proper methods of approach, how to arouse the buying urge, the common obstacles met in selling, the meeting of sales resistance, the closing of the sale, etc.

The class is limited in size to guarantee adequate participation by each student.

(Prerequisite, D 5)

2½ semester hours credit

D 7 SALES PROMOTION

The function of sales promotion; the development of plans and materials for stimulating sales; the consideration of publicity media; the preparation of direct advertising pieces for use among the sales force of the manufacturer or wholesale distributor; functions and uses of direct advertising, direct-mail advertising and radio advertising; the planning of sales campaigns; co-ordinating advertising and sales efforts; the preparation of sales manuals, display techniques, portfolios, etc., for use of the sales force.

(Prerequisites, D 1-2, 20-21)

2½ semester hours credit

D 8 SALES MANAGEMENT

This course is devoted to the function of the sales manager in terms of his relationship to the marketing process, involving the aspects of planning, investigation of the market, pricing the product, planning the sales effort, management and control of the sales personnel and sales operations. It includes in detail a study of the types of sales organizations, sales policy, sales campaigns, financing of sales, and the selection, training, and supervision of the sales force.

(Prerequisite, D 5)

2½ semester hours credit

D 9 SALES EXECUTIVE TRAINING

Successful sales managers do not "just happen" — they must be trained. There is no guarantee that the "star salesman" will become a successful sales manager. Every company's future is dependent upon a succession of capable men trained to manage its sales.

This purely practical course, placing special emphasis upon the sales personnel, is designed for sales managers or company sponsored salesmen who have demonstrated management potentialities; considers on an advanced level the comprehensive function of the sales manager — his varied responsibilities; the importance of setting goals; selection and training of salesmen; turnover; the high cost of sales: follow-up, records, and periodic appraisal; the function of leadership; delegation of responsibilities; motivation to procure maximum sales production.

(Prerequisite, D 6)

2½ semester hours credit

D 10 MARKET RESEARCH

This course deals with the techniques of research investigations in the collection and utilization of data relating to the problems of marketing. It includes the planning of mail and field investigations, preparation of material, testing results, interpretation of findings, preparation of reports leading to the development of new products, sales methods or sales areas.

(Prerequisites, D 1-2, Ec 20-21)

2½ semester hours credit

D 11 MARKETING MANAGEMENT SEMINAR

This course uses the framework of a dynamic economy so that the marketing operation is integrated into its economic environment. It attempts to incorporate recent developments in the behavioral sciences such as applied economic theory, social psychology and operations research.

The course concerns itself with marketing alternatives such as product variation, marketing channels, price, advertising, personal selling and the location of the company's operations. In deciding which particular combination of these alternatives to use in order to solve a given marketing problem, the student is forced to consider the following: competition, demand, cost, the structure of distribution and the law.

Once the typical considerations pertinent to these problems are analyzed, the student uses qualitative rules and guides or quantitative measurements of contribution to profit, in choosing the best marketing strategy. Certain patterns of behavior based on experience and observation aid in eliminating unfeasible strategies. After estimating the effect of the feasible strategies on company profit, and with the aid of market research techniques to collect information as the basis for a rational decision, strategy is chosen that will yield the maximum contribution to company profits.

2½ semester hours credit

(An advanced level course with enrollment only by approval of the Dean)

D 20-21 PRINCIPLES OF ADVERTISING

A comprehensive course designed to familiarize the student with the nature and scope of advertising and its place in the commercial and economic structure. History, definition and functions of advertising. Organization and functions of advertising departments and advertising agencies. Varieties of advertising and media. Problems, market investigation, planning campaigns. Laws, ethics, and regulations. A study of the broader aspects of advertising with special emphasis on current trends and developments.

5 semester hours credit

D 22 ADVERTISING PROBLEMS

This course, conducted on a seminar basis, is designed to analyze the sales conditions and to find the advertising objectives of specific case subjects. It brings into use knowledge previously gained in the planning of an advertising campaign, the solving of advertising objectives and the development of advertising strategy, using the most adequate and effective media. The course is in effect a workshop in which each student personally develops his own advertising project.

2½ semester hours credit

(Prerequisite, D 20-21)

D 23 ADVERTISING COPY

A course designed to furnish essential groundwork for successful copy writing. Includes study of market-analysis, product and consumer research; class discussion of and participation in comparisons of media and methods, from the standpoint of the copy writer; drill and practice in writing specific industrial, general, retail, radio and mail-order advertising copy; development of techniques, vocabulary and facility.

(Prerequisite, D 20-21)

2½ semester hours credit

D 24 ADVERTISING PRODUCTION

The methods and techniques of advertising production, including layouts; use of illustrations; the development of typography; types and type selection; composition; engraving processes; the several printing processes, including letterpress, lithography, and gravure; specifications and estimates.

(Prerequisite, D 20-21)

2½ semester hours credit

D 25 ADVERTISING MEDIA

This course is intended to prepare the student of advertising for the intelligent choice of advertising media requisite to adequate and economical market approach and coverage. It includes practical analysis of consumer, trade and professional magazines, newspapers and other publications, direct-mail, radio and television, outdoor advertising; fundamental product research to establish criteria for advertising media selection; a study of relative values of media from the standpoint of merchandising from manufacturer, through retailers, to the consumer.

(Prerequisite, D 20-21)

2½ semester hours credit

D 26 DIRECT-MAIL ADVERTISING

A practical presentation of principles and procedures in mail-selling campaigns, including the aspects of list building; writing effective sales letters, circulars, and catalogs; copy testing; analysis of selected direct-mail campaigns; printing and production methods and costs; postal rates and regulations; and intervals of mailing, etc.

(Prerequisite, D 20-21)

2½ semester hours credit

D 30-31 FOREIGN TRADE

The course is designed to introduce the student to world trade, its development and current status, the economic and political developments which affect the volume and direction of the flow of goods. Subjects discussed are the balance of international payments; trade agreements; tariff and non-tariff control measures and policies; export and import departments; middlemen; foreign agents and distributors; branch houses; handling import and export traffic; study and choice of markets; settlement of trade disputes; international banking facilities, foreign credits; foreign exchange and foreign investments. The execution of foreign trade documents will be carried out throughout the course.

(Prerequisite, Ec 1-2)

5 semester hours credit

D 40 PURCHASING

A practical study of the functions and duties of the purchasing agent, the organization and administration of his department, and his relations with other departments. The following are representative of subjects discussed: the purchasing function, qualifications and responsibilities of the purchasing officer; purchasing organization and procedure; quality determination, inspection and inventory control; source selection and procurement by manufacture; price policies, forward buying and procurement budgets.

2½ semester hours credit

D 41 CONSUMER PACKAGING

This course is designed to cover the many problems to be reckoned with in creating a package to meet the high competition of current marketing trends with particular emphasis on color, art layout, and design for adaptability to automatic packaging equipment. It involves all of the basic package materials and forms, and includes such important topics as "The Evolution of the American Market," "Market and Consumer Research" and "Legal Protection." The course is further highlighted with lectures presented by experts from the packaging field.

(Prerequisite, D 20-21)

2½ semester hours credit

D 42 INDUSTRIAL PACKAGING AND PACKING

The science of packaging and packing for protection during shipment has experienced rapid advance. This course is devoted to current practices of industry as well as specifications applied to government contracts. Considered in this course are the basic types of containers; inner packaging; container design and utilization; dynamics of cushioning; government packaging, packing, and marking; testing of materials and containers; consumer packing-machinery and equipment; packing, loading, and shipping heavy apparatus; specifications for materials and containers.

(Prerequisite, IM 40-41)

2½ semester hours credit

D 50 CREDIT FUNDAMENTALS

This course furnishes instruction in the organization and functions of the commercial credit department; the classification of credit and the several types of agencies involved; the factors involved in a credit risk; the investigation of credit factors; credit services.

(Prerequisite, A 3-4 or 30-31)

2½ semester hours credit

D 51 CREDIT PROBLEMS

This course continues into the more detailed problems of the credit manager in determining credit disposition. The following subjects are included: ratio analysis of financial statements, statement analysis by comparison, collection problems and procedures, insolvency in its various forms, creditors' legal aids, credit insurance and guaranties, the general problems of the credit manager in administering his function of the business organization, activities of the National Association of Credit Men.

(Prerequisite, D 50)

2½ semester hours credit

D 52 CONSUMER CREDIT

This course covers all phases of credit extended to consumers—retail stores; bank personal loans; consumer financing by banks; real estate financing; bank charge account plans; small loan companies; sales finance companies; utility companies; credit investigation and evaluation; collection procedures; Credit Bureau operations; legal aspects of credit.

(Prerequisite, D 50)

2½ semester hours credit

ECONOMICS (Ec)

Economics is the basic foundation upon which the general principles of business as a science are founded. A mastery of the underlying economic laws enables the student to see clearly the forces which business men must use in arriving at solutions to their problems. An appreciation and understanding of economics is a necessary factor in the equipment of a progressive business man.

Ec 1-2 BUSINESS ECONOMICS

The study of our economic society, its institutions and their practices as essential prerequisites to the successful conduct of business affairs and to the development of intelligent citizenship. The introductory course aims to provide the significant economic principles and facts about industry, labor, money, banking, the distribution of income to the factors of production, business fluctuations, and forms of social organization. Consideration is given to current economic problems, in relation to the basic principles and laws, and to their implications for individuals, business, and government, as well as society at large.

CORE COURSE

4 semester hours credit

Ec 3-4 FINANCING BUSINESS OPERATIONS

The needs for capital in the production and merchandising of goods and services; the sources of long-term and short-term funds and their utilization form the basis for the introduction to finance as a basic function of business management. Credit instruments, trade credit, secured and unsecured loans, specialized forms of short-term financing and consumer credit are considered in the first semester. Money, the commercial banking structure, the Federal Reserve System, thrift institutions and other financial agencies and services as they relate to operations of the business firm form the basis of the second semester, which concludes with brief consideration of both international and public finance.

CORE COURSE (Prerequisites, Ec 1-2; A 1-2; 3-4 or 30-31)

4 semester hours credit

Ec 5-6 FINANCIAL POLICY AND PLANNING

This course includes a study of the corporate form of organization, the various types of securities utilized, and the financial problems involved in promotion and expansion of enterprises, in mergers, in sale of properties, and in failures and reorganizations. Attention is devoted to the planning aspects of the corporation financial officer's job with respect to budgets, operating reports and their analysis. Policy matters such as executive compensation, dividend policies, pensions and profit-sharing plans are also dealt with.

CORE COURSE (Prerequisite, Ec 3-4)

4 semester hours credit

Ec 7 INVESTMENT PRINCIPLES

The characteristics of the entire range of securities from government bonds to common stocks form the foundation of this course as they relate to various types of investment programs. Sources of information, mathematics and mechanics of investment and the differing analytical approach to various industries are considered primarily from the viewpoint of the individual private investor interested in practical methods of capital preservation.

(Prerequisite, Ec 5-6)

2½ semester hours credit

Ec 8-9 APPLIED SECURITY ANALYSIS

This course is designed to acquaint the student with methods used by practicing security analysts in their studies of various industries and to provide practical information useful in future analysis of companies operating in these industries. It includes review of basic principles of Security Analysis; tools used by practicing analysts; analytical study of various industries comprising our economy, including the major consumer goods, capital goods, service industries, public utilities and railroads. Practicing analysts who are specialists in their respective industries will comprise the faculty. These instructors will develop the problems affecting their industries, the methods used in appraising their outlook, and the approaches to the problems of analyzing the securities of individual companies within these industries. A term paper is required of each student, during the preparation and writing of which he is assigned to a practicing analyst for technical assistance.

(Prerequisites, A 34, Ec 7 or equivalent)

5 semester hours credit

Ec 10 MANAGEMENT OF PERSONAL FINANCE

The purpose of this course is to give help to young men and women with the financial problems they face in charting wise programs of handling their personal finances. It is introduced by a discussion of money, its function, dollar value, and an appreciation of true values in life, using money to achieve the same. The course continues with a consideration of the following: expense control through budgeting; wise buying methods and policies — charge accounts, installment buying; financial institutions for borrowing money; protection against risk to person and property; methods of saving; the place of life insurance in financial planning; owning a home; investing in securities; trust funds, investment trusts; making a will; business fluctuations and the planning of personal finances.

2½ semester hours credit

Ec 11 ECONOMIC GEOGRAPHY

This course is concerned with the role of geography, geology, and climatology in determining the centers of population, the location of natural resources, and the development of agriculture and industry. It considers their location in terms of their natural relationship to the flow of world trade. The socio-economic principles that underlie the development of resources in different countries and climates are emphasized. It also analyzes the political-economic aspects of resource distribution and development in the form of trade and world relationship.

2½ semester hours credit

Ec 12 GOVERNMENT CONTROLS IN BUSINESS

A study of the economic and political relationships which exist between business and government with particular reference to the Sherman Act and Anti-Trust Laws; Securities and Exchange Commission; Interstate Commerce Commission; regulation of public utilities; the Co-operative Movement; the Social Security Act; government and labor; business regulation by taxation.

(Prerequisite, Ec 1-2)

2½ semester hours credit

Ec 20 MANAGEMENT STATISTICS

The objective of this course is to introduce the student to statistical techniques and their application to the analysis of problems in business and industry. It presents the fundamental concepts underlying analytical methods and serves as a preparation for advanced courses in statistics and quality control.

It is primarily concerned with descriptive measures of shape, location, and dispersion, an introduction to basic probability, sampling and simple analysis of observed distributions. The student also gains practice in tabular and graphic presentation. A part of each session is devoted to laboratory practice and solution of problems.

CORE COURSE *(Prerequisite: M 2-3)*

2 semester hours credit

Ec 21 MANAGEMENT STATISTICS—BUSINESS APPLICATIONS

This course is required for all students not enrolled in the Production or Industrial Management curricula. The course is concerned with the testing of simple hypotheses, use of confidence intervals, and the application to business problems of sampling distributions, particularly the normal, binomial, Poisson, *t*, and Chi-square distributions. Problems drawn from business situations also illustrate the application of the analysis of variance and correlation techniques.

(Prerequisite, Ec 20)

2 semester hours credit

CORE COURSE *for all except Production and Industrial Management students*

Ec 23 STATISTICAL METHODS IN FORECASTING

This course introduces the student to the application of time series and analysis. Among the principal topics considered are the measurements of secular trends by free hand and mathematical methods; the measurement of seasonal fluctuations; cyclical fluctuations; the general nature and calculation of index numbers; and a discussion of regression and correlation.

(Prerequisite, Ec 21)

2 semester hours credit

Ec 30 INTERNATIONAL ECONOMICS

This course analyzes foreign trade and finance in terms of current practices and theories. It discusses national welfare and foreign trade; international accounting and what the balance reveals; the making of international payments and documents used; the rate of exchange; international equilibrium; foreign trade and the national income; principles behind protection; trade control through the tariff, import quotas, exchange control and their evaluation; international commodity agreements and commercial treaties; monetary policy problems; the international gold standard; exchange reserve funds; exchange stabilization fund; the shortage of dollars; the International Monetary Fund; international investments.

(Prerequisite, Ec 1-2)

2½ semester hours credit

Ec 31 MANAGERIAL ECONOMICS

The purpose of this course is to show how economic analysis can be used in formulating business policies. It is an attempt to bridge the gap between the logic of economic theory and the problems of policy for practical management. The course stems from the conviction that the economic theory of the firm should be the core of work in business administration and that the procedures and methods of such specialized areas as marketing, production, and accounting should be related to the broad profit-making objective of business enterprise. In developing an economic approach to executive decisions, the course draws upon economic analysis for the concepts of demand, cost, profit, competition, etc., that are appropriate for the decision. Modern methods of econometrics and market research are employed to the extent and to the degree that they are necessary for getting estimates of the relevant concept.

(Prerequisites, Ec 1-2, 20-21)

2½ semester hours credit

Ec 32 MONETARY POLICY

The Federal Reserve System is charged with regulating the amount of money in our economy. Their policies vitally affect the business community. An understanding of Federal Reserve and Treasury policies and action is essential to an understanding of our economic system. The primary purpose of the course is to integrate the student's knowledge about the causes of inflation and deflation. Discussion centers on the nature of money and credit and their influence on interest rates, prices and the level of our economy. Monetary theories are studied to the extent time permits.

(Prerequisite, Ec 5-6)

2½ semester hours credit

Ec 34-35 BUSINESS PLANNING AND RESEARCH

To assist business men to make more definite and more accurate business decisions through a broader understanding of the significant information and statistics regarding our economic system and its operations is the major objective of this course. Sources of information, strengths and weaknesses of principal measures of business activity and the use of several widely accepted indices in general business forecasting are a major part of the study, as well as sales forecasting, business cycle analysis and the effects of the broadening relation of government policies upon the individual business firm.

(Prerequisites, Ec 5-6, 20-21)

5 semester hours credit

ENGLISH (E)

The value that comes from the effective use of good English in business reports and communications is being increasingly emphasized by business leaders. All students who are candidates for the degree or certificate are required to pursue systematic courses in English. Those having outstanding deficiencies may be required to take additional courses in English.

E 1-2 ENGLISH AND BUSINESS COMMUNICATIONS

This course is designed to provide instruction in the basic skills of communication so essential in the proper conduct of business. In addition to a practical view of the principles of grammar and punctuation, the course provides for frequent drill and discussion of word usage, sentence and paragraph construction, techniques of outlining and summarizing, and vocabulary building. Writing assignments are given in exposition and argumentation to develop adequacy for good usage and expression. In the second half of the year a study is made of currently accepted forms of business letters and interoffice communications. The course includes reading and discussion of contemporary essays. Entrance into this course is predicated on successful completion of the preparatory English diagnostic examination which will be administered the first meeting of this class.

CORE COURSE

4 semester hours credit

E 3-4 BUSINESS WRITING AND REPORTS

The course gives detailed attention to the problems in writing which call for accurate observing, technical descriptions, collecting of data, rewriting, analyzing problems, interpreting and evaluating information, defending judgments, drawing conclusions. Different types of reports, report format, and documentation are studied as well as library and business research techniques. The writing projects are varied and literary subjects are included as well as those which are business and professionally oriented. The course work has been planned to meet the demands for writing which are required of the trained man in business. Assignments in readings are taken from all conventional literary types to encourage an interest in the humanities and good reading.

CORE COURSE (Prerequisite, E 1-2)

4 semester hours credit

E 10 EFFECTIVE SPEAKING FOR BUSINESS

Those who wish to speak convincingly, to overcome self-consciousness, and to develop self-confidence will find this course meeting their needs. Students are trained in the selection and organization of speech materials, the delivery of the speech, and in other important essentials of effective speaking. The entire course is practical and not theoretical. Work is centered around the interests and topics of business men and is specifically adapted to their needs.

2½ semester hours credit

E 12 BUSINESS CONFERENCES

The management of modern business is conducted to a large extent through the use of conferences. *Increase in the technological aspects of our economy has accentuated the use of this management tool.* The objective of this course is to present techniques basic to group leadership. It provides instruction in the planning, participation, and leading of conferences. *Questioning techniques designed to stimulate, shape, and control group response are emphasized.* Classes are limited in size to allow regular and frequent participation by students. The conference topics are carefully designed so that the discussions are means of disseminating very worthwhile information regarding business management problems.

2½ semester hours credit

E 20 READING SKILLS

This course is devoted primarily to the development of correct reading techniques which lead to the ability to read faster with a higher degree of comprehension. Exercises for improving basic speed and comprehension include work with tachistoscope and films. Special attention is given to analytical reading and the improvement of study habits.

1¼ semester hours credit

E 21 VOCABULARY DEVELOPMENT

This course is designed to assist the student in developing an adequate vocabulary and in improving his ability to use this increased power of words for more effective presentation of ideas. It includes the important aspects in the development of the English language, how it has drawn from many other languages important roots, prefixes and suffixes, antonyms for variety and force of expression, etc.

1¼ semester hours credit

E 22 SPEED AND COMPREHENSION IN READING

The ability to read well is a skill of considerable value to students and to those in professional practice. Efficiency can generally be improved by analysis with subsequent substitution of good for bad reading habits. Special equipment for instruction and drill exercises are used to increase reading rate and comprehension. Methods to improve study habits and to develop an effective vocabulary are included.

2½ semester hours credit

E 23 CREATIVE THINKING

A development course primarily designed to teach the student to understand and apply his latent creativity to his vocational activities. Confidence and skill are developed by the student through directed practice in stimulating Creative Thinking exercises. Considerable attention is given to idea motivation, imagination development, experience analysis, and idea evaluation.

1¼ semester hours credit

E 24 ETHICS FOR MODERN BUSINESS

Man in his social evolution has passed through many stages of development. In contrast to the "privilege" of a few centuries ago, possession now carries with it responsibility. Modern management in an automated society must develop an increasing social consciousness and recognize the full implications of its decisions and actions. Against the background of the various systems of ethics, this course will critically analyze these implications in the changing climate in which modern business is conducted.

1¼ semester hours credit

INDUSTRIAL MANAGEMENT (IM)

With the complex and rapidly changing conditions of modern production, the functions of administration and management must be clearly defined and maximum economies effected. Through the problem approach, these courses train the student to supplant guesswork and trial and error processes with organized knowledge and proven management methods.

IM 2 WORK MEASUREMENTS I

This course is concerned with the fundamentals of time study and their use in setting production standards. The instruction includes history and background of time study; rating operator performance; mechanics of setting labor standards; construction and use of simple multi-variable charts; the value of predetermined time value systems and their variations; presenting time study data to management; the relation of time study to cost control and cost reduction; establishing standards for bench groups and conveyor lines; estimating from blueprints. Laboratory practice will supplement the classroom instruction.

2½ semester hours credit

IM 3 WORK MEASUREMENTS II

Review of stop-watch time study and performance ratings. Introduction to the use of element time studies for developing standard data. Incentives for indirect labor including supervisors, salesmen, etc. Procedure for handling involved time studies. Development of tables, families of curves, formulae, nomographs, and multi-variable charts for synthetic rate-setting purposes.

(Prerequisite, IM 2)

2½ semester hours credit

IM 4 SYNTHETIC TIME STANDARDS—M.T.M.

The development of time values for manufacturing operations using synthetic time standards is rapidly becoming widely established in industry, making it necessary for those in time study and its related fields to become acquainted with it. This course is designed to give the student a knowledge of the fundamentals of what is perhaps the most widely accepted system, methods-time measurement. This lecture and laboratory course discusses the basic motions and elemental time values, providing the student with an opportunity to develop time standards for actual operations encountered in manufacturing operations.

(Prerequisite, IM 2)

2½ semester hours credit

IM 5 WORK SIMPLIFICATION I

The course is designed to present the fundamental principles underlying motion analysis and work simplification. Included in the subjects considered are the following: Process and operation analysis through the use of process charts, flow diagrams, operation charts, man-and-machine charts, principles of motion economy. Workplace layout, labor-saving tools and equipment, laboratory development work. Practical applications of work simplification with particular emphasis upon cost analysis.

2½ semester hours credit

IM 6 WORK SIMPLIFICATION II

Short review of Work Simplification I; advanced study and laboratory practice in operations analysis and improvement; flow process, multiframe process, and multiple activity charts; work simplification as an aid to plant layout; camera analysis; work sampling or ratio delay study; integration of methods and time study; human relations in methods engineering.

(Prerequisite IM 5)

2½ semester hours credit

IM 7 JOB ANALYSIS AND EVALUATION

Basic principles underlying theory of wage calculation, job elements and their definitions, rating scales, writing job descriptions and specifications, selection of appropriate rating plan, setting up job factors and maximum point values, use of several methods of determining specific point values. Development of wage structures.

2½ semester hours credit

IM 8-9 PRODUCTION PLANNING AND CONTROL

A basic treatment of the planning principles applied to the development and operation of a manufacturing unit, including market and sales research; plant design and determination of required physical facilities; the internal organization; the engineering organization for development of product; production planning, including scheduling, dispatching, purchasing, receiving, stockkeeping; and measures of performance. This course accents the controls required for the orderly operation of the production department. The following subjects related to planning, scheduling, and control are included: basic organization, plant layout, flow, sales forecasts, budgeting, planning, routing methods, plant and departmental capacities, cost, standardization, ordering, purchasing controls, receiving and storage, scheduling, materials handling, dispatching and subcontracting, machine loading, assembly, inspection, inventory control, measures of performance, co-ordination of sales and manufacturing, and introduction to mechanical means of control.

CORE COURSE

4 semester hours credit

IM 10 MATERIALS OF PRODUCTION

Fundamental to the study of production processes and the control of quality is a knowledge of the materials of production and the techniques of inspecting the accuracy of processing. This lecture and laboratory course first considers the study of materials, especially ferrous, non-ferrous, special alloy metals, plastics, etc., in terms of their basic characteristics, e.g., structure; hardness; strength in compression, tension, shear; workability; thermal, physical, electrical and chemical properties.

The course continues into the techniques and standard measuring equipment and gauges for mechanical inspection; discussion of tolerance limitations of machine tools and other processing equipment in common use.

(Prerequisite, IM 8-9)

2½ semester hours credit

IM 11 PRODUCTION PROCESSES

Basic to the study of production is a thorough understanding of the processes and shop production methods employed in the manufacture of products using various types of materials. Concentrated attention is applied to such processes as castings; hot-working, cold-forming, and joining of metals; machine shop production methods; plastics and plastic molding. The common production tools such as shears, presses, press brakes, lathes, boring mills, screw machines, milling machines, drills, shapers, slotters, planers, broaching machines, grinders, and saws are studied in detail including their uses, machine capacities, limitations, flexibilities, etc.

Working with actual products accompanied by production blueprints, the student determines the manufacturing processes required, selects the appropriate machines, equipment and tool setups. Under certain conditions alternate methods and equipment must be used. These are evaluated in terms of their practicality and economic advisability. Process sheets are prepared for all manufacturing operations involved for presentation to the production control department as a basis for scheduling and computation of machine loading charts.

(Prerequisite, IM 8-9)

2½ semester hours credit

IM 13 INDUSTRIAL SAFETY — INDUSTRIAL ACCIDENT CONTROL

A non-technical course dealing with the organization and administration of a comprehensive accident prevention program. It will include an analysis of the basic industrial hazards, the various factors involved in industrial accidents with corrective action; the responsibilities and functions of top management, the safety engineer, the supervisor, and the safety committee; the training of employees, supervisors, and other management personnel; the investigation and analysis of industrial accidents; protective equipment and clothing; maintaining management and employee interest.

2½ semester hours credit

IM 14 MATERIALS MANAGEMENT SEMINAR

This course is to give the mature experienced student an insight into the managerial responsibilities of a materials control function. This seminar treats the subject with a case study, conference approach, in which the class operating as a team of industrial engineers sets up a materials control function, staffs it, writes up job descriptions and flow charts, designs forms and sets up policies. The areas covered are customer service, ordering, scheduling, dispatching, purchasing, receiving, stockkeeping, warehousing and shipping.

(Prerequisite, IM 8-9)

2½ semester hours credit

IM 15 MANUFACTURING MANAGEMENT SEMINAR

This course approaches the problems of manufacturing operations as experienced on the plant manager level. Reflecting the various elements involved in production planning and control, it is concerned with the economics of production when considering the aspects of specialization, simplification, standardization, and diversification as well as expansion, contraction, or integration. It includes such factors of production as materials, plant location and layout, power, maintenance, labor supply, organization, wage policy, etc., and concerns itself with considering the controls of the manufacturing processes, i.e., product development, scheduling, inventory, quality, cost, and budgetary controls. $2\frac{1}{2}$ semester hours credit

(An advanced level course with enrollment only by approval of the Dean)

IM 20 MANAGEMENT STATISTICS—QUALITY CONTROL

This course is required for all students enrolled in the Production or Industrial Management curricula. This course is an introduction to the elements of statistical quality control and its use to attain reduction in scrap and rework, lower costs, and reduce complaints. Emphasis is on the solution of production and engineering problems with the aid of statistical tools to prevent the manufacture of defects. Statistical principles are demonstrated practically rather than mathematically, and actual case histories illustrate principles and methods.

The subject material includes determination of machine and process capability, use of histograms to identify abnormal variability, the use of quality control charts for measurable and nonmeasurable quality characteristics, rational determination of tolerances, scientific sampling methods for process control, acceptance sampling of material by lots and the use of Military Standard 105B, current government quality control requirements, and psychological factors in controlling quality.

(Prerequisite, Ec 20)

2 semester hours credit

IM 21 ADVANCED QUALITY CONTROL

This course is designed primarily for those who require a more detailed understanding of the application of quality control techniques. The material covered in Quality Control is enlarged on and a number of the more recently developed techniques are treated in detail. Application of the methods to several particular industries, such as metal-working, textile, aircraft, chemical process, electron tube, screw machine products, is studied.

Subjects covered are special purpose control charts; multi-vari charts; pictograms; PD-diagrams; the Lot Plot inspection method; narrow-limit gauging; variables sampling plans; the Span Plan for process capability analysis; principles of visual inspection; establishing quality assurance; check inspection methods; special trouble-shooting techniques. Each student conducts a term project involving application of the methods in his own field.

(Prerequisite, IM 20)

$2\frac{1}{2}$ semester hours credit

IM 22 MANAGEMENT OF QUALITY CONTROL

A major consideration for effecting a successful quality control program lies in its administration. This course is pointed at bringing an appreciation of the non-technical aspects of administering a quality control program. In developing these concepts, intensive discussion is given to economics of quality; relation of design and inspection to control of quality; organizing for quality control; quality control engineering; integration of quality functions; methods of obtaining quality assurance; and case studies.

(Prerequisite, IM 20)

$2\frac{1}{2}$ semester hours credit

IM 23 QUALITY CONTROL ROUND TABLE

An integrating course for those who have completed all or a majority of the courses in Quality Control. Basically designed to test the application of the students' knowledge to actual industrial situations, most of the work revolves about the students' own problems. For this reason, the course is strictly limited to those who have a full background in the subject and are in a position to devote outside time and industry to the application of quality control technology. Practice in written and oral report presentation is afforded, with emphasis on methods of selling ideas through reports. The psychology of selling statistical ideas to management is discussed. Weekly round-table discussions are held at which the students are expected to contribute their own experiences. The outside work project constitutes a large share of the course work.

(Prerequisites, IM 20-21, 22)

$2\frac{1}{2}$ semester hours credit

IM 24 RELIABILITY ENGINEERING

Complexity of design with the necessity for infallible performance of the product in the field under increased stress levels is characteristic of the requirements placed upon the manufacturer of military equipment, and on a more limited scale materials and parts for civilian goods. Accompanied by tighter specifications and shorter lead time between design and finished product, these requirements have created the necessity for a new field of activity involving the collection and analysis of data relating to design, production, and field performance of the product in terms of reliability factors. The course will cover in sequence reliability concepts, Definitions and Military Specifications. It then deals with contract negotiations involving reliability program planning, funding, organization and supervision along with reliability activities prior to and after design release. It examines vendor and subcontractor reliability requirements, considers system evaluations and reliability data. It concludes with a study of basic reliability statistics and quality control with a projection of future trends for this area. (An advanced level course with enrollment only by approval of the Dean) 2½ semester hours credit

IM 30-31 PLANT LAYOUT

This course is taught on a combination lecture and laboratory method using the latest techniques and equipment employed in industrial practice. Instruction proceeds principally by the project method where a plant site is chosen for the manufacture of a specific product. The product is analyzed to determine the processes involved, the number and types of machines and auxiliary equipment necessary for manufacture. Flow charts are prepared and machine and equipment location determined using A.S.M.E. approved two-dimensional templates and three-dimensional scale models.

In addition to the physical arrangement of machines and equipment, consideration is given to the layout of utilities such as power, light, water, sprinklers, drainage, telephones, heating equipment, lavatories, etc. Alternate layouts are considered and all cost factors including estimates of construction changes are evaluated to determine most economical layout. Detailed attention is given to the layout of office areas and departments servicing production as well as areas designed for employee safety and convenience. Design is checked for conformance to local and state regulations pertaining to building codes, zoning, safety, and fire protection. Finished layout drawings are prepared for presentation to management.

(Prerequisites, IM 5, 8-9, 11)

5 semester hours credit

IM 32 INDUSTRIAL EXPERIMENTATION I

The two main problems confronting experimenters in the laboratory and in the factory are the evaluation of data and the design of experiments, both simple and complex. Statistical methods for solving these problems are essential tools of the process engineer and factory trouble-shooter. This course in statistical methods is specifically directed at quality control, engineering, laboratory and other personnel who wish to increase their skill and efficiency in design and analysis of experiments.

Modern small-sample techniques are applied to industrial problems. The use of statistical inference to make estimates and set confidence intervals of key characteristics of production lots and processes, design of single and multiple factor experiments, tests of significance, analysis of variance, use of the normal, binomial, Poisson, and Chi-Square distributions, as well as non-parametric methods are discussed. Short cuts and "rough-but-quick" tests are covered. Accent is on the application of these tools and to solution of typical problems. Throughout, the emphasis is on avoiding experimental blind alleys, with the associated vital savings in dollars and days.

(Prerequisites, IM 21, Ec 21-22)

2½ semester hours credit

IM 33 INDUSTRIAL EXPERIMENTATION II

The evaluation of data and the design of experiments are essential tools in laboratory research, in pilot plant development, and of the engineer and factory trouble-shooter. Consequently, this course dealing with tests of significance, analysis of variance, correlation techniques, and experimental design is specifically directed at producing greater efficiency and competency for quality control personnel as well as experimenters of all classes.

The person completing the course will be equipped not only to select an efficient design for his experimental work, but will also be enabled to make an objective evaluation of the data to determine whether the variations in the data are significantly different from those which might be expected purely on a chance basis. It is important to note that the ability to make this kind of distinction helps avoid experimental blind alleys, with the associated vital savings in dollars and days.

(Prerequisite, IM 32)

2½ semester hours credit

IM 34 INTRODUCTION TO OPERATIONS RESEARCH I

With the increasing complexity and competitive aspects of our American economy, the executive of the future must base his management decisions upon facts and data and less upon pure judgment values. Operations Research is providing, through the scientific approach, quantitative values for the several variables interacting in the problems with which the decision maker is involved in formulating policy and directing his everyday activities. This management approach to an introduction to operations research will be taught on the descriptive rather than the developmental mathematical basis. It is expected that this course will be attractive to men with science and technical educational backgrounds who are related through their employment to the operational problems which face the decision maker on all levels. Any grounding in mathematics through an introduction to calculus and a basic understanding of statistics will be helpful but not a prime requisite. Part I will be devoted to the Formulation of the Problem; the Idealized Research Model; the Construction and Solution of the Practical Research Model; Testing the Model and Solution; Establishing Controls and Putting the Solution to Work.

(Prerequisite, Ec 20-21)

2½ semester hours credit

IM 35 INTRODUCTION TO OPERATIONS RESEARCH II

Part II considers the tools and techniques which are currently available for use in Operations Research. These include Mathematical Statistics, Computers, Symbolic Logic and the many types of models such as Inventory Models, Allocation Models and Replacement Models. Case studies which demonstrate the Methodology of Operation Research and the use of tools and techniques will be used to further the student's understanding of the Operations Research approach to the "Executive Type Problem."

(Prerequisite, IM 34)

2½ semester hours credit

IM 40-41 MATERIAL HANDLING — FUNDAMENTALS

The handling of materials as an integrated part of the production program offers much promise in efficiency of operation and reduction in manufacturing costs. This course approaches the problem from both the unit workplace environment and the internal flow of raw materials through the several manufacturing processes to the storage of finished goods and their loading for shipment. Materials handling equipment will be considered in practical terms of engineering characteristics, selection for specific uses, and cost factors of operation.

(Prerequisites, IM 8-9, M 2-3)

5 semester hours credit

IM 42 MATERIAL HANDLING — PROBLEM ANALYSES

This course comprises a series of case studies, each designed to illustrate material handling problems encountered in various types of industries. In the development of the analyses, reference to source material will be required for technical data and specifications toward the selection of equipment and methods which will provide the most economic and effective operations consistent with the factors involved.

(Prerequisite, IM 40-41)

2½ semester hours credit

IM 43 MATERIAL HANDLING — COST DETERMINATION

This course is designed to thoroughly cover all elements of material handling cost including techniques in determination of cost reduction data, operating costs, replacement policies, maintenance costs, etc.

(Prerequisites, A 30-31, IM 40-41)

2½ semester hours credit

IM 44 MATERIAL HANDLING — ENGINEERING PRINCIPLES

A thorough treatment of those major engineering principles which form the basis of material handling equipment design and its application. This course, which is intended primarily for those who do not have a formal engineering background, deals with such subjects as horsepower calculations, simple beams, floor loading, effect of ramps, and determination of battery requirements.

(Prerequisite, IM 40-41)

2½ semester hours credit

IM 45 MATERIAL HANDLING — CONVEYORIZATON

A comprehensive course in the characteristics, advantages, disadvantages, and practical application of all types of gravity and powered unit-handling conveyors, including skate wheel, roller, live roller, belt, slat, overhead trolley, reciprocating and continuous type lifts, and drag-line systems.

(Prerequisite, IM 40-41)

2½ semester hours credit

IM 46 MATERIAL HANDLING — COMMERCIAL CARRIERS

This course deals with the vital handling operations which take place after the finished product leaves the industrial plant. Considerable emphasis is given to the latest developments in commercial freight terminal handling operations, loading techniques, "on-board" handling facilities, and the material handling considerations in truck, railroad, ship, and airplane design.

(Prerequisite, IM 40-41)

2½ semester hours credit

IM 47 MATERIAL HANDLING — INDUSTRIAL WAREHOUSING

A comprehensive, practical approach to the growing problem of industrial warehousing, covering such vital fields as space utilization, distribution, stock selection, storage facilities, locator systems and equipment application.

(Prerequisite, IM 40-41)

2½ semester hours credit

IM 48 MATERIAL HANDLING — YARD HANDLING

This course gives particular emphasis to the highly specialized handling techniques used in the "fresh air" industries such as lumber, petroleum, brick, fishing and shipbuilding. In addition, thorough coverage is given to the field of yard handling of non-ferrous metals, fuel, lumber, drums, and refuse coincident to industrial plant operation.

(Prerequisite, IM 40-41)

2½ semester hours credit

IM 49 MATERIAL HANDLING — IN-PROCESS HANDLING

A new concept in materials handling associated with manufacturing and assembly operations; the role of materials handling in automation, cost control, product design, and production control.

(Prerequisite, IM 40-41)

2½ semester hours credit

IM 50 MATERIAL HANDLING — MULTI-STORY BUILDING

This course is especially well-suited to industrial New England where a high percentage of the industrial plants are multi-storied and of ancient vintage. Special emphasis is given to techniques in vertical transportation and in the maximum utilization of floors of limited capacity and poor column spacing.

(Prerequisite, IM 40-41)

2½ semester hours credit

IM 51 MATERIAL HANDLING — BULK MATERIALS

A comprehensive and practical approach to the problems inherent in the handling of fluid, powdered, granular, and lump materials.

(Prerequisite, IM 40-41)

2½ semester hours credit

INSURANCE (In)

In a complex economic structure, the function of risk bearing becomes vital. The Insurance industry has experienced tremendous growth in serving this need. The courses offered are basic in their presentation and are designed to train for effective careers in one of the many divisions of operation.

In 1-2 INSURANCE PRINCIPLES

A foundation course to an intelligent understanding of Casualty and Fire Insurance and its function in our economy; measurement of risk and rates; types of carriers, their organization, and regulation; loss adjustment and loss prevention; underwriting and reinsurance. The second semester is devoted to an examination of the insurance contract and to a brief survey of the principal forms of Casualty, Fire, Marine, Surety, and Disability insurance, and their uses.

5 semester hours credit

In 3 INSURANCE FOR MANAGEMENT

Every business manager has the responsibility for protection of the assets and continued life of his company under any eventuality. This course, approached from a management viewpoint, discusses the various risks present in modern business operations, and procedures to be taken with types of insurance used to indemnify against anticipated losses.

2½ semester hours credit

In 4-5 CASUALTY INSURANCE

This is a comprehensive study of casualty insurance. It includes such insurance contracts as workmen's compensation and employers' liability, accident and health, schedule and comprehensive general liability, and miscellaneous crime coverages. Special attention is paid the policy contract, various rating procedures, endorsements, the methods used to determine premium payments, insurance auditing procedures, etc. The subjects covered are considered in detail through careful analysis of the several underlying insurance contracts.

(Prerequisite, In 1-2)

5 semester hours credit

In 6-7 FIRE INSURANCE AND ALLIED LINES

This course includes the history and development of Standard Fire Insurance Policies, presenting a detailed study of the Massachusetts Standard Fire Policy, its modifying forms and endorsements; methods of rating; policy writing procedures; and loss handling. It includes a study of extended coverage, consequential loss contracts, and collateral fire lines.

(Prerequisite, In 1-2)

5 semester hours credit

In 8-9 INLAND MARINE INSURANCE

Covers the origin, development and present scope of Inland Marine Insurance and a complete analysis of the provisions of transportation policies, property floaters, bailees' customers' floaters and special risk policies. The course is designed to provide a thorough grounding in the fundamental principles of Inland Marine Insurance, with special emphasis on policy forms, rates, underwriting and the applicability of the coverages to the needs of the insuring public.

(Prerequisite, In 1-2)

5 semester hours credit

In 10-11 FIDELITY, SURETYSHIP, AND CRIME INSURANCE

This course is introduced by a general consideration of crime insurance. Coverage under fidelity and suretyship is discussed individually, including the various forms of fidelity, judicial, contract, public official bonds, license and permit bonds, miscellaneous surety bonds, burglary and robbery insurance, and the comprehensive crime policies. The several bond and policy forms under the foregoing are studied individually, supplemented by the underwriting procedure in conjunction with the use of the manuals.

(Prerequisite, In 1-2)

5 semester hours credit

In 12 COMPREHENSIVE HOMEOWNERS POLICY INSURANCE

A course designed to meet the professional needs of men actively engaged in the insurance business. Using policy forms and company manuals as tools of instruction, the course will tackle the multitude of problems arising out of the attempt to integrate in a single policy the varied types of risks involved in the multi-peril packaging of insurance coverages. The instruction will be specifically concerned with the peculiar types of problems arising in selling, underwriting, claims adjustments, etc., in the Comprehensive Homeowners Insurance. Ample opportunity will be provided for discussion of case situations encountered in the individual's practice.

2½ semester hours credit

In 13-14 CLAIMS PROCEDURE

The function and organization of the claims department; the claims adjuster, his qualifications, duties, and responsibilities; the theory and procedures of handling insurance claims. This course presupposes a knowledge of the basic coverages, and is handled on a lecture and discussion basis, using case studies, however, limited to general casualty, fire, burglary, bonds and inland marine insurance.

(Prerequisites, In 4-5; 6-7; 8-9; 10-11)

5 semester hours credit

INDUSTRIAL RELATIONS AND PERSONNEL (IR)

The management of human relations in business represents one of the most challenging aspects of our industrial developments. Opportunities are unlimited for qualified persons in all phases of management with a sound understanding of the underlying principles of labor-management relations. The continuance of our American system of industrial economy demands a more thorough understanding of the principles underlying labor-management relations and their responsibilities one to the other and mutually to the public.

IR 1 PSYCHOLOGY FOR BUSINESS

Business psychology is the study of predicting and influencing human behavior in business. It provides an understanding of man's mental life, of how the individual and the group behave and are influenced in their behavior, and of how the business man may predict and control his own behavior and that of those with whom he works. The study and analysis of the student's own personal problems and behavior constitute a valuable and interesting phase of the course.

2½ semester hours credit

IR 2-3 HUMAN RELATIONS

Effective handling of human problems has become a factor of vital importance to management. This course in human relations in business is the foundation to all personnel policy and offers an approach or understanding of value not only to those in personnel work but also to all persons having supervisory relationships. Subjects included for discussion are the techniques of approach to situation analysis; problems in selection; training; employee rating; change of employee status; supervision; wage policies; complaints and grievances; employee morale; labor turnover; discipline; health; safety; employee participation; collective bargaining; public relations.

5 semester hours credit

IR 4 PERSONNEL MANAGEMENT PRACTICES

This course, in contrast to IR 2-3, is specifically related to the organization, function, and procedures of the personnel department. It is concerned with such problems as the organization of the personnel department; its relationship and responsibility in the total management organization; recruitment of manpower; techniques of interviewing and counseling; employee selection; testing; proper job placement; training; job analysis and evaluation; merit rating; promotion, transfer, discharge; employee publications; standards and conditions of employment; personnel forms, records, and reports.

2½ semester hours credit

IR 5 WAGE ADMINISTRATION

The course is a comprehensive study of the underlying theory of industrial wages. Specific consideration is given to job and salary analysis and evaluation; merit rating; incentive wages; wage payment plans. The importance of a sound wage structure to healthy employer-employee relations and the administration of wages through collective bargaining from the production as well as the labor relations point of view.

(Prerequisite, IR 4 or 20)

2½ semester hours credit

IR 6 EMPLOYMENT TESTING

Selection and placement procedures usually comprise several steps, including the interview, psychometric testing, references, etc., all of which are fitted together to form an over-all judgment. This course is concerned with tests used in business and industry to determine aptitudes, personal characteristics and qualifications for employment, proper job placement, counselling, promotion, special training, supervisory or executive potentialities. It discusses tests in terms of type and purpose, test characteristics, test construction, test interpretation, use and limitations of testing.

(Prerequisite, Ec 20-21)

2½ semester hours credit

IR 7 PRACTICAL TRAINING METHODS FOR BUSINESS AND INDUSTRY

Subjects covered range from principles and methods of effective "on-the-job" training to the handling of formal or informal training groups. The objective is to provide a thorough grounding in the psychology of learning; techniques of effective teaching; personality qualifications for successful training; a review of job instruction training (J. I. T.) and job relations training (J. R. T.); use of the case analysis method; role playing; training tools; visual aids; the value of example and demonstration; methods of analyzing and meeting training needs; the principles and practices of organizing and administering a training program; follow-up procedures to insure results; class projects to provide practical application of material covered in the course.

2½ semester hours credit

IR 8 TECHNIQUES OF SUPERVISION

Supervision is the function of directing, controlling and co-ordinating the combined efforts of men, machines and materials. Positions of managerial capacity involve the responsibility of supervision. This course is designed to provide basic instruction in such phases as the supervisor's responsibilities and objectives; planning the work and employee assignments; employees' attitudes toward management, equipment and materials; records and reports; improving individual performance; progress of employees; personnel relations; handling of grievances; training; administering of company policies; matters related to wages; the development of a congenial, enthusiastic community of work interest through the co-ordination of the work of all employees.

2½ semester hours credit

IR 20 LABOR-MANAGEMENT RELATIONS

This course provides a basic treatment of labor economics, including the history of the labor movement and of industrial relations, with emphasis on the present period; theory of collective bargaining; effect of collective bargaining upon income of labor, employment, accumulation of capital, and national income. Policies and practices of labor and management in respect to hiring and layoffs, technological changes, wages and market position, closed and open shop, union-management co-operation, government regulation of labor relations, etc. The problem of strikes and lockouts and public policy as to industrial relations are covered.

CORE COURSE

2 semester hours credit

IR 21 LABOR LEGISLATION — UNION-MANAGEMENT RELATIONS

A study of the legal framework for collective bargaining, beginning with the historical development and the impact of the anti-trust laws on labor unions, and continuing with the federal and state laws regulating injunctions in labor disputes; the Railway Labor Act; the National Labor Relations Act; a detailed study of the Labor-Management Relations Act (Taft-Hartley); the procedures, powers, and limitations of the agencies administering the statutes.

(Prerequisite, IR 20)

2½ semester hours credit

IR 22 LABOR LEGISLATION — STANDARDS AND CONDITIONS OF EMPLOYMENT

A course covering the content and relationship of federal and state regulation of wages, hours and working conditions, including minimum wage, hours of work, and child labor legislation. Old age and survivors, unemployment and workmen's compensation insurance programs are also covered as well as the anti-discrimination laws covering veterans' re-employment rights and fair employment practices.

(Prerequisite, IR 20)

2½ semester hours credit

IR 23 THE LABOR AGREEMENT — NEGOTIATION AND ADMINISTRATION

The negotiation, re-negotiation, and administration of labor contracts; study of the component clauses such as union recognition and security, management prerogatives, seniority, vacations, wages, hours, working conditions; grievance analysis and arbitration procedure developed through case studies in actual labor-management relations as affected by such clauses, and the entire collective bargaining agreement and relationship.

(Prerequisite, IR 20)

2½ semester hours credit

IR 24 LABOR RELATIONS SEMINAR

An advanced discussion of current labor-management problems such as union responsibilities, management responsibilities, the annual wage, profit sharing, criteria for wage determination, welfare programs, etc. Cases under consideration will cover problems that are timely and specific. Class limited in size.

(Prerequisites, IR 20, 21, 22, 23)

2½ semester hours credit

IR 25 YOUR PERSONALITY

This course is designed to help the student appraise his inner resources so that he might be better prepared to meet the outer pressures of life. It deals fundamentally with the principles of psychology of personality. Through a personalized approach, this "inward-looking" course enables the individual to interpret his behavior and to develop an understanding which would help him to improve his relationships with others. The course also considers methods of measuring characteristic traits, aptitudes, interest, attitudes.

1¼ semester hours credit

IR 26 CAREER PLANNING

Professional success is the result of well-defined objectives activated by an organized plan of procedure. This course considers the basic elements in life planning divided into the aspects of choosing one's life work; the continuing relationships and activities involved in professional development; and the broader concepts of planning for a well-rounded life. It endeavors to provide a systematic basis for the development of a personal profile of abilities and interests — a realistic self-evaluation of these factors in terms of one's future. It includes the techniques of job-getting as well as consideration of those factors involved in professional growth.

1¼ semester hours credit

LAW (L)

Underlying the ever-increasing complexity of modern business is a growing body of law which defines and directs business operations.

L1-2 LEGAL ASPECTS OF BUSINESS I

Contracts: nature, kinds and formation of contracts; essential elements; form and interpretation of contracts; breach, remedies and damages. Agency: nature, purpose and formation of agency relationship; rights and duties of principal and agent, scope of agent's authority; rights and duties of principal and third persons; termination of agency. Employer and employee: compensation laws; duties of master; contributory negligence doctrine; injuries to third persons. Bailments: nature and kinds; rights and duties of parties. Negotiable instruments: bills, notes and checks; requirements of a negotiable instrument; negotiation; liabilities and defenses of parties; procedure upon dishonor; discharge. Personal property: nature and classification, methods of acquiring title. Sales: nature of sales contracts; warranties; transfer of title; and remedies of seller and buyer.

CORE COURSE

4 semester hours credit

L3-4 LEGAL ASPECTS OF BUSINESS II

Transportation: duties and liabilities of common carriers. Insurance: formation and function of insurance contract; kinds of policies; legal phases of life, property and other insurance. Suretyship: rights of the surety and the guarantor; rights and duties of the creditor; defenses of the surety and guarantor. Partnerships: nature, kinds and formation; rights and duties of partners: partner's authority to bind firm; relation of partners and third persons; dissolution and winding up. Corporations: nature and creation; charter; powers, rights and liabilities; nature and kinds of capital stock; rights and liabilities of stockholders, directors and officers. Mortgages: rights and duties of mortgagor; rights and duties of mortgagee; rights after default. Real Property: landlord and tenant relationship; classification of tenancies; rights and duties of landlord; rights and liabilities of tenant. Trusts and decedents' estates: wills and intestacy. Bankruptcy: Federal Bankruptcy Acts; acts of bankruptcy; adjudication; rights and duties of bankrupt; unsecured, secured and priority claims; extensions, compositions, and other debtor-relief provisions; discharge.

CORE COURSE (Prerequisite, L 1-2)

4 semester hours credit

LIBERAL ARTS

Courses in the Liberal Arts represent an integrated program which touches upon the humanities as well as the physical and social sciences to provide a well-rounded background of understanding essential to modern business management.

Recent economic and technological trends, projected at an accelerated rate into the years immediately ahead, are making phenomenal changes in the requisites of the business manager of the future. Developments in "management science" are struggling to keep pace with technological "know-how." The leading thinkers who have charted the course of civilization throughout the ages are making us conscious of the new range of responsibility for leadership in today's complex and interdependent society. Our future destiny depends upon a more active understanding of these interrelationships and interresponsibilities. It is the function of education to prepare for this new type of management leadership by providing the student with an insight into human nature, the forces that have shaped his cultural inheritance, and the recognition of the growing importance of business in society and world affairs.

The purpose of education has often been expressed as twofold: (1) teaching the student how to earn a living and (2) teaching him how to live. The first objective is approached through professional courses comprising our several curricula in business administration.

Successful and happy lives are built, however, upon a knowledge and understanding of the varying environments which envelop one's activities and associations, accompanied by an ability to adjust to the changes ever present in a dynamic society. It is felt, therefore, that the second objective can best be achieved through an integrated and sequential pattern of instruction which, viewed through the eyes of the individual, considers in a sequential evolution the forces which affect him as an individual and govern his activities as a member of society. Such a total pattern of instruction of necessity calls upon the store of knowledge gathered by man over the ages. However, to achieve this objective in a professional program, it should not be presented as knowledge for knowledge's sake, but being man-centered in concept relates this knowledge to develop within the student a better understanding of himself, and a sensitivity to his varying environments which in effect comprise his life. It should help to develop within him a social consciousness of his responsibilities to society and stimulate the development of philosophical concepts which he can use to govern his life pattern.

LA 1-2 MAN AND HIS PHYSICAL UNIVERSE

One of the primary functions of any modern educational system is to give those exposed to its influence an opportunity to see themselves in true perspective in relationship to the sweep of time and the stretch of space. The extent of man's knowledge and the very fact that there is a fundamental unity of nature prescribes that the artificial departmental frontiers be broken down.

It is natural, therefore, that this sequence designed to acquaint the student with his relationship to his various environments should start with his physical universe — the physical universe with its fixed laws of science — and move gradually yet continuously to the uncharted realms of man's quest for guiding philosophic concepts. The acquaintanceship thus established should liberalize his thinking and develop within him a sense of belonging, of participation, an "at homeness" in the world in which he lives.

The pattern is a constant unfolding of man's conquest of nature and opens with a consideration of the earth as an astronomical body and of our neighbors in space. It proceeds into the nature of matter and energy and their applications to everyday living, the physics and chemistry of modern industrial developments, as well as the more recent developments in atomic research.

It relates man to the controlled changes in his physical environment through an understanding of some aspects of the world's work, its material resources, and some elements of communication. The inanimate structure is concluded by a consideration of the uncontrolled elements such as meteorology and the constant process of geologic change in which the history of man is written.

Moving from the inanimate, we next find man as one of the endless variety of life on this earth. Life is a profound mystery. No one knows with certainty where it came from originally nor has been able to explain exactly what it is. Study over the years, however, has unraveled some of this mystery. For instance, life became associated with protoplasm which requires a constant supply of food; living organisms must provide for the perpetuation of their own kind; and that to continue, living things must adjust themselves to their environments resulting in a constant process of evolution or extinction. Nature maintains its own balance and serious effects result from man's disturbance of this balance of nature. Science has made extensive discoveries relative to the nature and control of disease, and the application of Mendelian principles has aided in the improvement of living species.

Man has learned that he must depend upon living things for food and an abundance of other materials for his complicated activities. He needs to know how his own body operates in order to take care of it. Not only the intelligent conservation of man's resources but actually his continuance as a species requires an understanding of the factors which affect all forms of life. These broad objectives are studied within the framework of the history of life, the geophysical haunts of life, the abundance of life, and the value of life.

6 semester hours credit

LA 3-4 MAN IN SOCIETY

Business today accepts the basic precept that management must get things done through people. This necessitates a clearer understanding of the anthropological, biological, and psychological factors and forces which govern and direct man's actions. Thus, from the broad study of the biotic world, the sequence now moves to a study of man, both as an individual and as a member of society.

Before one can adequately understand others, he first must understand himself especially as seen through the eyes of others. Therefore, this course, based upon the fundamentals of general and differential psychology and the dynamics of personal adjustment, takes an

introspective approach in terms of the student's relationships with others to provide an understanding which might result in effectiveness, happiness, harmoniousness, and fullness of satisfaction in his daily living. The course recognizes the needs and motivations which stimulate one's activities as well as the changing pattern involved in the process of maturation and aging.

We next move into a consideration of the relationships of man within the basic units of our society and the problems encountered in his efforts to live together. Here we must consider the norms which give structure, stability, and order to society through which the factors involved in the individual patterns of social behavior develop into the broader institutional patterns of the family, the church, the community, industry, and governments, both national and international. The student is made to recognize that society is in a state of constant flux and he is introduced to some of the factors which create this constant change.

(Prerequisite, LA 1-2)

6 semester hours credit

LA 5-6 MAN'S CULTURAL INHERITANCE

Culture is a complex web covering all aspects of life, and every culture is derived from many sources. It is an accretion of the ages and the result of multifarious influences, emotional orientations, and precepts, which profoundly influence social behavior. It finds its roots in anthropology — the study of man — and the changing pattern of man's experiences throughout history.

Culture is a uniquely human phenomenon. No culture can exist divorced from living beings, for culture and society are inseparable. Among all the creatures of the animal kingdom, man stands alone in his ability to create and sustain a culture. Cultures are processes of behavior constantly changing and modifying and vary at times quite widely even within units of a social pattern. It is a composite abstraction usually approached through the study of anthropology, culturalology, the social and political sciences, economics, and history, and finds expression in literature, art, music, etc.

We as Americans have a rich heritage which has come to us from many areas and civilizations. It is a heritage which in terms of material and spiritual values has raised man to his greatest heights. As one philosopher expressed it, however, every living thing contains within itself the seed of its own destruction. Therefore, the preservation of our cultural inheritance can come only through a firm understanding and recognition of the sacrifices which have entered into the development of our complex social, economic, and technological development to date. The culture we pass on to posterity will be wise and well directed only as we see and profit from the history of man over the ages.

Thus this course of necessity must be a composite arising out of fundamental questions regarding the nature of man, his life, the structural organization of human society and the ideas and issues out of which his ultimate destiny will develop. Out of such thinking, education must develop the leadership for a free world.

(Prerequisites, LA 1-2, 3-4)

6 semester hours credit

LA 7-8 MAN AND VALUES

There is an important sense in which every man must be his own philosopher, just as in a democratic society citizens exercise political choice and make political decisions even though they do not actively engage in politics or hold political office. For every man must live his own life in a universe which he did not create, in conflict with obstacles against which he must constantly push, and he must make choices and decisions which exhibit his values and appeal to his preferences. If his life is not to be merely mindless, and if he refuses to permit his actions to be simply the result of drifting or the spineless acceptance of the values of others, then he must come to some conclusion about the values which he wishes to prevail and the nature of the universe in which he lives. Such conclusions are bound to be philosophical.

Every man recognizes a relationship with the infinite. In his search for the moral and ethical concepts through which he can express this relationship he must explore the experiences of others through their meditative writings. These at times are expressed in the literature of the great books which have shaped man's development, and again in the more profound treatises on philosophy, social ethics, comparative religions, etc. Everyone, whether he realizes it or not, has a personal philosophy whether he be ignorant or broadly educated. It may be narrowed and circumscribed by doubts and fears or it may be synthesized from an understanding of the broad gamut of man's thinking, resulting in positive beliefs and intellectual freedom. Every successful life has been wisely charted.

(Prerequisites, LA 1-2, 3-4, 5-6)

6 semester hours credit

LAW ENFORCEMENT AND SECURITY

LE 1 ADMINISTRATION OF JUSTICE

A survey of the evolution of justice from earliest times, developed historically, with particular emphasis on western justice and American justice including the roles played by the judiciary, federal law enforcement agencies, state police and investigative organizations, county agencies, and municipal departments.

2 semester hours credit

LE 2 LAW ENFORCEMENT ADMINISTRATION AND MANAGEMENT

A survey of some of the fundamental principles of police organization, administration, and management, including staff and line functions, chain of command, span of control, selection of personnel, and promotional systems.

2½ semester hours credit

LE 3 and 4 POLICE INTERROGATION

A comprehensive course presenting the various techniques of police interrogation with concentration on questioning suspects, witnesses, victims, informants, and complainants. The laws governing interrogation practices are reviewed as well as the psychology of interrogation and the use of the lie detector as an investigative aid. Mock cases are used so that all class members have an opportunity to interrogate under simulated conditions.

4 semester hours credit

LE 5 and 6 CRIMINAL INVESTIGATION AND CASE PREPARATION

The fundamentals of criminal investigation including crime scene procedure, crime scene search, collection and preservation of evidence, recording the crime scene, police photography, some of the more basic principles of forensic science, surveillance and the development of informants. Methods of preparing the case for court are studied thoroughly and completely.

4 semester hours credit

LE 7 POLICE PATROL

A comprehensive study of all types of uniformed police patrol including foot, vehicular, water, and air patrol stressing the basic assumptions of and rationale for each type including considerations for deployment of personnel, beat layouts, mechanics of arrest, riot control raids, road blocks, stopping methods, and transportation of prisoners.

2 semester hours credit

LE 8 CRIMINAL LAW

The history of criminal law; its development in America; constitutional considerations; elements of a crime; statutory make-up; elements of various crimes; the law of arrest; entrapment; criminal responsibility; defenses; and procedures in the court room.

2½ semester hours credit

LE 9 EVIDENCE

Rules of evidence; principles of exclusion; evaluation and examination of evidence and proof; competency; consideration of witnesses; laws of search and seizure.

2 semester hours credit

LE 10 and 11 TRAFFIC LAW ENFORCEMENT

The enforcement of law as it relates to traffic; accident prevention and investigation; driver testing and licensing; safety education; traffic surveys; selective enforcement; traffic engineering; administration of traffic divisions; reporting; records; prosecuting; the traffic court; training.

4 semester hours credit

LE 12 RECORDS IN LAW ENFORCEMENT

A study of the various types of law enforcement record systems, including consideration of the utilization of forms, electronic systems, record analysis, and specialized control through the use of records.

2 semester hours credit

LE 13 CRIMINAL IDENTIFICATION

A thorough presentation of the available means of identifying criminals including consideration of fingerprinting, portrait parle, Bertillonage, observation and description, photography, handwriting, typewriter identification, and identification of skeletal remains with stress on the practical application of identification principles in modern police work.

2 semester hours credit

LE 14 INTRODUCTION TO CRIMINALISTICS

The elements of microscopy, comparative microscopy, spectroscopy and chemistry as they are used in the study of firearms, hair, fibers, blood, paint, tools, glass, documents, laundry marks, poisons and other organic and inorganic materials which comprise physical evidence. This course is intended only as a survey course in Criminalistics.

2 semester hours credit

LE 15 CRIME PREVENTION

This course is designed to explore the role of the juvenile officer as well as the role of the police officer without juvenile responsibility in crime prevention with emphasis on theory, administration, control, treatment, confinement, community resources, relations with the public, and the juvenile court.

2 semester hours credit

**LE 16 SPECIAL PROBLEMS IN
LAW ENFORCEMENT ADMINISTRATION AND MANAGEMENT**

An advanced course presenting police control methods from the administrative standpoint and including consideration of special problems in regard to narcotic traffic, sex deviates, minorities, strikes, natural and atomic disasters, juvenile crimes, vice control, and community relations.

2 semester hours credit

LE 17 and 18 INVESTIGATIVE REPORT WRITING

This course is designed to instruct the law enforcement officer in determining report content as a result of interpreting and evaluating information. Particular emphasis is placed on collection of information, accurate description, analysis of information and concise writing. The student is required to participate in numerous report writing projects, all of which are designed specifically to meet his everyday needs in the investigative field.

4 semester hours credit

LE 19 and 20 POLICE SUPERVISION

A comprehensive consideration of command-level problems as these relate to supervision, including planning and research, training, discipline, examinations, promotions, rating systems, auxiliary units, organization, budgetary considerations, deployment of personnel, line and staff distinctions, policy formulations, high-level administrative responsibility, inter-departmental relations, problem handling, personnel policies, supervisory relationships at all ranks, wages, grievances, morale, and safety.

4 semester hours credit

LE 21 POLICE PUBLIC RELATIONS

This course is designed to apply the principles of sound public relations to the entire police operation. Consideration is given to public speaking, press releases, press relations, police-community relations, and police-public contact.

2 semester hours credit

LE 22 POLICE RESEARCH METHODS

This course is designed to give each student an opportunity to conduct a research project which must be related to a specific police interest or operation. The student chooses his research project in consultation with his faculty advisor. The course meets officially twice during the semester. The student may consult with his advisor concerning his project at any time. A project paper showing the results of research is required.

2 semester hours credit

LE 23 SURVEY OF SECURITY IN AMERICAN BUSINESS AND INDUSTRY

A survey of private protection in the United States including its history, its development, and its present status with particular attention given to business loss through fire and theft as a rationale for the existence of security programs. This course considers all of the various types of security and the relative importance of each.

2 semester hours credit

LE 24 GOVERNMENT SECURITY PROGRAMS

A discerning and comprehensive presentation of all significant government security programs with emphasis on the Department of Defense Security Regulations, the Atomic Energy Commission, the Central Intelligence Agency, the National Security Agency, and the Army, Navy, and Air Force security agencies as they all relate to the security of the United States.

2 semester hours credit

LE 25 PLANT PROTECTION

The organization, administration, and management of plant protection operations including special technical and legal problems in industrial facilities of all types; the management of private guard forces; police liaison; the use of electronic and mechanical prevention devices; selection of personnel; public relations; plant parking and traffic control; records; prevention programs; training; screening employees; rules and regulations; special functions; deployment of personnel; wages; unions; and equipment.

2 semester hours credit

LE 26 INDUSTRIAL FIRE PREVENTION

The organization, administration, and management of a fire prevention program within business and industry; the use of a fire brigade; specialized training; employee incentives; sprinkler systems; equipment; construction techniques; employee relations; rules and regulations and their enforcement; plant location; inspections; fire department liaison; and special hazards.

2 semester hours credit

LE 27 RETAIL SECURITY

The operation of security departments in retail stores of all types with emphasis on functions, honesty shopping, dishonest employees, shoplifters, professional criminals, unions, juveniles, management relations, public relations, special laws, strikes, deliveries, warehouse and mail order operations, receiving and shipping departments, drug store operations, grocery operations, store detectives, special interrogations, and training.

2 semester hours credit

MATHEMATICS (M)

M 1 PREPARATORY MATHEMATICS

An intensive problem-solving course in arithmetic and high school algebra. Topics include manipulation of common and decimal fractions, percentages, interpolation in common reference tables, and solution of simple algebraic equations. An important part of this course is practice in reducing "word problems" to mathematical terms, and thus arrive at solutions in an orderly sequence. This course has been designed to prepare students for college-level courses in mathematics if they lack practice or training in the topics usually covered in a high school algebra course.

Non-credit

M 2-3 MATHEMATICS

This course is the normal prerequisite for all later courses in mathematics, statistics, and quality control. During this one-year course, basic mathematical principles and techniques are discussed, with application drawn from business and industry, as well as from engineering and the sciences. The main concern is to establish an understanding of the fundamental mathematical processes and to acquire facility with modern computational techniques and aids, including the use of alignment charts and the slide rule.

Practical work includes problems in graphic presentation, simple analytic geometry, solution of triangles, manipulation of exponents and logarithms as well as a survey of selected topics in the field of topology and symbolic logic. Entrance into this course is predicated on successful completion of the Preparatory Mathematics diagnostic examination which will be administered the first meeting of this class.

CORE COURSE

4 semester hours credit

M 4-5 GRAPHIC AND MATHEMATICAL TECHNIQUES IN INDUSTRY

This lecture and laboratory course is designed to provide students with elements of mathematical techniques and shop drawing essential to study in the field of industrial and production management.

Instruction in shop drawing includes the use of drafting equipment, the principles of orthographic projection and sketching, blueprint reading, and systems of dimensioning indications of limits and tolerances, designation of locating points, and commercial finishes.

The second half of the course is designed to give the student a working knowledge of plane trigonometry, analytic geometry, and the calculus. The student will have an opportunity to practice his skill in solution of more complicated equations and to find maxima and minima, as well as deriving equations for velocity and acceleration in common physical phenomena. The use of determinants in the solution of simultaneous equations and design of alignment charts is demonstrated for problems drawn from industry.

(Prerequisite, M 2-3 or equivalent)

4 semester hours credit

700 PRE-ENGINEERING MATHEMATICS

This course is devoted to a thorough study of Algebra I and Plane Geometry.

701 ALGEBRA

Although the primary purpose of this course is to lay a thorough groundwork for the subsequent courses in analytic geometry, calculus, and applied mechanics, it is nevertheless a complete unit in itself, and will enable the student to handle a considerable number of the problems arising in engineering practice.

Proceeding from a rapid review of the fundamental operations of algebra, the work continues with a thorough study of fractions, functions, linear and quadratic equations, equations in quadratic form, graphs, exponents, complex numbers, binomial expansion, variation, and equations of higher degree than the second.

(Prerequisite, 700 or Mathematics Placement Test)

3 semester hours credit

702 TRIGONOMETRY

This course includes the solution of all triangles by both natural and logarithmic functions, identities, radian measure, principal values and the solution of trigonometric equations. Particular attention is given to the applications of trigonometry to engineering practice.

(Prerequisite, 701)

3 semester hours credit

703 ANALYTIC GEOMETRY AND DIFFERENTIAL CALCULUS

This course provides a smooth transition from algebra and trigonometry into the calculus. Included are the studies of the straight line, the circle, and conic sections, using rectangular co-ordinates only. The graphs of trigonometric, logarithmic, and exponential functions are also covered. Then follows the differentiation of algebraic and transcendental functions, both explicit and implicit, with some applications. Slopes of curves, maxima and minima, derivatives of higher order, velocity and acceleration in rectilinear motion are included.

(Prerequisites, 701, 702)

3 semester hours credit

704 INTEGRAL CALCULUS

This course deals with integration as the inverse of differentiation as well as the limit of summation. The topics covered are methods of integration; use of integral tables; differential equations with separable variables; the differential equation of rectilinear motion; definite integrals; areas in rectangular co-ordinates; length of curves; areas of surfaces of revolution; volumes of solids of revolution; multiple definite (iterated) integrals; centroids of plane areas; moment of inertia.

(Prerequisite, 703)

3 semester hours credit

OFFICE MANAGEMENT (OM)

Office management has developed rapidly in scope and status in response to the technical and diversified nature of the problems arising and the current trends toward the scientific approach to the solutions of these problems.

OM 1 OFFICE MANAGEMENT PRACTICES

This course considers the organizational, human, physical, and operational problems encountered by the manager of the modern office. It stresses the importance of the proper place of the office management function in effective company organization; the value of proper selection techniques, supervision, adequate compensation policies, and employee relations in building up an office force with desirable attitudes and abilities. It discusses principles of efficient office layout; working conditions; the analysis of office methods and systems; work simplification; the selection and use of office machines; and common office functions. Every effort is made to use the student's own office background as a sounding board for the subject matter.

2½ semester hours credit

OM 2 SCIENTIFIC MANAGEMENT IN OFFICE PRACTICE

This course is intended to provide basic instruction in the tools of modern scientific management, work simplification, time study, job evaluation and merit rating; work simplification as a means of improving work methods and procedures through motion study and process analysis; time study for work measurement and the establishment of standards; and job evaluation for determining the equivalency among the several jobs as a basis for a wage and salary structure. These scientific tools will be applied to office practices. Laboratory exercises will accompany the lectures.

(Prerequisite, OM 1)

2½ semester hours credit

OM 3 BUSINESS ORGANIZATION AND ADMINISTRATION

This course gives recognition to the function of management as an identifiable, measurable and transferable activity. The ever-increasing complexity of our economy has forced business men to look not only at the adequacy of their facilities, equipment, and methods of operation but also the organization of their management leadership structured to accomplish their companies' objectives through "people." The approach in this course will concern itself first with the profession of management in terms of its nature in its historical evolution to the modern concepts of centralization, decentralization, management by committee, and the unified concept of management including line and staff relationships, the use of specialized staff, as well as top management organization. Referral will be made by application to selected companies which have pioneered in this area by appropriate case studies. Organizational structures will be analyzed, organizational manuals defining responsibilities, accountability and programs of management development of employed personnel will be explored. Consideration will be given to the dynamics of organization involved in organizational structure changes and the problems incidental to such change.

(An advanced level course with enrollment only by approval of the Dean)

2½ semester hours credit

OM 10 OFFICE SYSTEMS AND PROCEDURES

This course is devoted to the techniques of system design to most effectively record and expedite the operations of the office and/or the factory. It deals with the elements of system analysis; methods of obtaining data and recording of existing procedures; procedure charts and charting techniques; developing, testing, installing, and adjusting new systems; measuring effectiveness of the system. Considerable time will be devoted to laboratory analysis of certain recognized systems and for the discussion of design problems submitted by members of the class.

(Prerequisite, OM 1)

2½ semester hours credit

OM 11 FORM DESIGN AND CONTROL

Forms in their relationship to office systems; forms designing tools, drafting techniques factors and principles of form design; problems of paper size and quality for specific usage. carbons, typography and printing specifications; forms housing; the design of general and specialized forms including system cards, visible file cards, tickets, bookkeeping and addressing machine forms, carbon interleaved forms, reproduction forms (hectograph and offset processes), strip accounting forms; forms control organization and administration.

(Prerequisite, OM 10)

2½ semester hours credit

OM 12 SYSTEMS ANALYSIS AND IMPROVEMENT

Tools and techniques of the systems analyst; the humanics of systems analysis; developing and presenting recommendations; setting up pilot operations; selling management and the workers; installing and checking the new operation. This course is conducted on the case method, using all of the tools of the systems analyst, i.e., process chart, procedure flow chart forms distribution (flow) chart, work distribution chart, layout flow chart, reports control chart, work measurement (productivity) chart, etc. Some problems are presented at the actual location through plant visitation.

(Prerequisite, OM 10)

2½ semester hours credit

OM 13 PUNCH CARD MACHINE METHODS I

This course consists of chalk talks, diagrammatic wiring, as well as actual control panel wiring and testing on electric accounting machines. Basic and advanced Control Panel Wiring will be taught on the following I.B.M. Electric Accounting Machines: Reproducing Punch (Type 514); Alphabetical Accounting Machine (Types 402-3 and 405); and Collator (Type 077). It will also cover functional card design and the integration of machine usage in the scheduling and flow of work.

Special course, non-credit

Designed specifically for I.B.M. Electric Accounting Machine Supervisors and Operators

OM 14 PUNCH CARD MACHINE METHODS II

An advanced course, continuing beyond Punch Card Machine Methods I to include I.B.M. Accumulating Reproducer (Type 528) and Electronic Calculating Punch (Type 604). Prerequisite for this course is satisfactory completion of Punch Card Machine Methods I or its equivalent in experience (usually at least three years of responsible employment as an operator or a supervisor).

Special course, non-credit

Designed specifically for I.B.M. Electric Accounting Machine Supervisors and Operators

OM 15 ELECTRONIC DATA PROCESSING FOR BUSINESS

This course is planned to acquaint the executive, accountant, methods and systems analyst with automatic electronic equipment and its potential applications. It will include a comprehensive survey of the machine components of such systems, their characteristics, and assembly to handle various business accounting problems; comparison of speed, capacity, flexibility, reliability and cost; discussion of input and output devices; general and special purpose computers and how they work, memory (storage), arithmetic and control elements, elementary programming, number systems, integrated data processing in business, economic advantages of automation and various applications in retail sales, inventory, payroll, and banking accounting. Special attention will be given to the smaller systems which are expected to gain wide acceptance.

2½ semester hours credit

OM 16 ELECTRONIC DATA PROGRAMMING

An advanced course intended to further acquaint business managers, accountants, methods and systems men, etc., with a general knowledge of programming techniques in order that they may better evaluate the capabilities of the several types of equipment designed for both small and large systems.

The course will include a brief review of program concepts with particular emphasis upon the stored program technique; the order structures used in a typical single address variable word length system and a three address fixed word length system; flow charting techniques; actual demonstrations and exercises in programming typical business applications for both single and three address systems in the university computation center; symbolic programming and automatic programming.

(Prerequisite, OM 15 or the equivalent in experience)

3 semester hours credit

REAL ESTATE (RE)

Real Estate occupies an important position in our social economy. The courses in this department are practical in their approach, designed to provide the necessary tools for those planning careers in any of the several phases of operation within this field.

RE 1 REAL ESTATE FUNDAMENTALS

This course examines real estate's place in our social economy. The operation and forces of the market itself, and its relation to over-all public interest; it includes land economics and development, the market, building and its problems, building construction, brokerage, starting a real estate business, mortgage lending, remodeling, insurance, planning and zoning, Government Legislation—V.A. Loan Guaranty and Federal Housing Administration insurance on G.I. and non-G.I. loans.

2½ semester hours credit

RE 2 REAL ESTATE LAW AND CONVEYANCING

This course covers the legal processes and instruments used in controlling real estate ownership and transactions involving the acquisition, use, enjoyment and disposition of real estate and including land titles, estates, contracts, agreements of sale, deeds, mortgages and foreclosures, easements, liens, leases, landlord and tenant relations and liabilities, purchase and sale of real estate, conveyancing, wills and probate, building and zoning laws, and insurance.

(Prerequisite, RE 1)

2½ semester hours credit

RE 3 REAL ESTATE MANAGEMENT AND INVESTMENT

This course offers more of a practical than theoretical approach to the relationship which exists between real estate investment and management, placing particular emphasis on the advantages and risks of investment in real estate, types of real estate investments, the workings of the real estate operator with regard to exchange of real estate and speculation, financing of real estate purchase and development, the relation of investor to manager and broker, real estate management as a business, the organization of a management department in a brokerage firm, management policies, rent and rental problems, the fundamentals of apartment house management and co-operative apartments.

(Prerequisites, A 30-31, RE 1, 2)

2½ semester hours credit

RE 4 REAL ESTATE FINANCE

An advanced course dealing with the current methods of financing real estate, especially designed for realtors, bankers, attorneys, appraisers, as well as students pursuing the real estate program. It considers banking systems, instruments of finance, including discussions of long-term leases and bond issues; techniques of mortgage lending; appraising; financing various types of real estate; the effect of income taxes on financing. The functions of the real estate broker and the government financing agencies form a base for this course. They are supplemented by discussions pertaining to the influence of federal financing institutions upon the field of real estate as a segment of our economy.

(Prerequisites, RE 1, 2)

2½ semester hours credit

RE 5 REAL ESTATE SALES AND ADVERTISING

The selling of real estate calls for specialized applications of the principles of selling and advertising, basic to which are the techniques of property listing; the securing, classifying and analyzing of prospects; methods employed in selling the various kinds of residential, business and industrial properties; creative selling; trading and exchanging; financial aids in selling; the economics and techniques of advertising; women in the field of real estate sales.

(Prerequisite, RE 1)

2½ semester hours credit

RE 6 OPERATING A REAL ESTATE BUSINESS

For the person who is about to enter the real estate brokerage business, and as a refresher course for those already established in the business, this course offers new ideas from authoritative sources, as well as general principles and practices of the business. Included in the course are lectures and discussions on what real estate embraces, getting started in the real estate business, establishing an office, pitfalls to avoid, the art of selling, the sale from start to close, land subdivision, renting and leasing, women's field in real estate, hiring and training salesmen, advertising, publicity and promotion, and compensation for brokers and salesmen.

(Prerequisite, RE 1, 2)

2½ semester hours credit

RE 7 REAL ESTATE APPRAISAL — RESIDENTIAL PROPERTIES

This course is designed to provide the student with the basic knowledge and tools necessary to enable him to appraise residential properties. Study is made of valuation concepts, the purposes of appraisal; the sources of, collection, and application of data used to prepare appraisals; the use of tables, residual techniques; special purpose properties, the summation and final estimate of value, and the writing of appraisal reports; preparation and presentation of expert court testimony.

(Prerequisites, RE 1, 2)

2½ semester hours credit

RE 8 REAL ESTATE APPRAISAL — COMMERCIAL AND INDUSTRIAL PROPERTIES

Presented in this course is the analyzing of business neighborhoods, the special appraisal functions, as applied to the following commercial and industrial properties: various types of business properties, retail store properties, heavy and light manufacturing properties, warehouse and waterfront properties, special purpose properties, banks, indoor and outdoor theaters, garages and gasoline stations, office buildings, combination store and offices, hotels apartment buildings; the appraisal reports.

(Prerequisites, RE 1, 2)

2½ semester hours credit

RE 9 SMALL HOME CONSTRUCTION AND ESTIMATING

A practical and authoritative presentation of information invaluable to the contract builder, the real estate operator or the owner-builder regarding residential construction, remodeling or repair.

The course deals specifically with the types of house architecture; house styling; modern subdivision methods; construction details from foundation to roof; selection, scheduling and specifications of materials, equipment and services; plans and plan reading; construction specifications; estimating costs of materials, labor, etc.; budgeting finances.

2½ semester hours credit

RETAILING (R)

Retailing occupies one of the major steps in the important field of distribution. Rapid changes in retail merchandising practices create complex and difficult problems, making a knowledge of modern control methods necessary.

R 1 RETAIL STORE MANAGEMENT

Development of modern retail organizations, including smaller and larger retail stores, store location and layout, wage payment methods, selling services, receiving and marking procedures, mail and telephone orders, adjustments, delivery of merchandise, retail accounting and control, and store protection and maintenance.

2½ semester hours credit

R 2 RETAIL STORE MERCHANDISING

This course presents the fundamental principles of retail store merchandising, including determination of customer demands, purchase planning, pricing, markups and markdowns, merchandise inventories, turnover, merchandising policies, and retail sales promotion. Particular emphasis is given to the emerging pattern of retailing in this country, including the growth of suburban stores, discount stores, and self-service operations. The course is presented through short cases and problems taken from actual operating experience of large, medium, and small stores.

(Prerequisite, R 1)

2½ semester hours credit

R 3 RETAIL STORE ADVERTISING

This course is devoted to the study of the elements of retail advertising. The various media used by retailers are considered with drill in the preparation of effective retail copy. A study is made of institutional, straight merchandise and sales copy as exemplified in current advertising of important retail concerns. The principles of layout receive attention as well as the mechanics of production, including art work, plates, typography, and printing. The aim is to furnish a practical foundation fitting students for a creative career in retail advertising.

(Prerequisites, D 20-21, R 1)

2½ semester hours credit

R 4 MERCHANDISE DISPLAY FOR SALES PROMOTION

Display as a tool of sales promotion; the function and organization of the display department in the promotion of merchandise through interior and exterior displays; selection and preparation of merchandise for display; the use of display fixtures; creating display arrangements and determining most effective locations; store traffic; impulse buying; display problems of the small stores; seasonal backgrounds; color and illumination effects in window and case displays; planning and budgeting to co-ordinate with store merchandising and management policies.

(Prerequisites, D 7, R 3)

2½ semester hours credit

TRANSPORTATION AND TRAFFIC MANAGEMENT (T)

The rapid changes in several phases of the transportation industry are creating many entirely new concepts in the methods and economics of business operation. The transportation courses below are designed to present a practical approach to the basic principles and practices of current procedures and operations.

T 1 TRANSPORTATION PRACTICES

The importance of transportation in the American economy; a comparative evaluation of the various available transportation services from the point of view of cost, total time in transit, reliability and geographical coverage, including movement of freight by rail, motor, water and air carriers, freight forwarders, parcel post and express as well as combinations and modifications of each; classification of freight; rules of classification; basic studies in rates and tariffs; freight claims, transportation insurance and warehousing. The basic factors involved in cost control are introduced.

2½ semester hours credit

T 2 TRAFFIC MANAGEMENT

The application of the principles of transportation and the principles of management to industrial activity. The traffic manager in the carrier organization; comparative advantages of different modes of transportation; selling the transportation service; government regulation and traffic management; use of tariffs; documentation; miscellaneous charges, rules and regulations. The industrial traffic manager, duties and qualifications; the industrial traffic management department; filing of claims, handling of freight; traffic management objectives.

(Prerequisite, T 1)

2½ semester hours credit

T 3 ADVANCED TRAFFIC MANAGEMENT PROBLEMS

This course applies the principles of transportation and the principles of traffic management to the solution of a series of actual and typical problems in industrial traffic management and carrier traffic management, and export and import procedure. The problems embody the application of the precepts of regulation and rate selection, as well as detailed analysis of comparative services and their costs.

(Prerequisites, T 1, 2)

2½ semester hours credit

T 4 SELLING TRANSPORTATION SERVICES

This course deals with the nature and function of transportation service as an item bought and sold; the various types of transportation service available; matching the proper service to the proper need; engineering the sale of transportation service as contrasted with the hazardous "solicitation of freight"; what the transportation salesman should know about service and rates; legal and ethical restriction on selling transportation service; liaison between sales traffic, and operations from a sales viewpoint; various methods of proof that transportation service is non intangible.

(Prerequisites, D 5, T 1)

2½ semester hours credit

T 5 OCEAN TRANSPORTATION

This course includes the principles and practices of ocean transportation of freight; common, contract and tramp carrier operations; methods of calculating and applying rates and charges in ocean transportation; cargo control; customs procedures; free zones; through movement from and to inland points; port authority operation and port development; legal aspects of ocean freight movement.

(Prerequisite, T 1)

2½ semester hours credit

T 6 AIR TRANSPORTATION

This course deals with the chronological development and scope of the air cargo industry including air mail, air freight, and air express. It considers the characteristics of aircraft as cargo carriers; practical applications of the airlines' official tariffs; the competitive position of air cargo transportation in the over-all transportation system; legal aspects of air cargo transportation; the effects of air transportation on our economy.

(Prerequisite, T 1)

2½ semester hours credit

T 7 TRANSPORTATION INSURANCE

This course discusses the risks in the transportation industry for which insurance coverage offers protection. It includes the consideration of carrier risks such as public liability in the event of loss of life or personal injury, loss or damage to property, workmen's compensation carrier risks such as cargo protection while freight is in transit under common carrier liability coverage from the shipper point of view with respect to in-transit all-risk floater insurance rights and liabilities of carrier and shipper in the event of loss or damage; specially designed insurance coverages for unusual transportation conditions.

(Prerequisite, T 1)

2½ semester hours credit

T 8 CURRENT TRANSPORTATION PROBLEMS

Seminar course in the application of advanced transportation practices to specific requirements of industry; the development of optimum transportation cost control based upon the given conditions in selected case study firms; construction of an effective traffic department liaison of traffic department with other departments of the company; rate record systems for observation and analysis of current and past transportation costs; specific approaches for transportation cost reduction, such as reclassification, departures from class rates; private carrier operation; shipper and consignee co-operatives, etc.; reliable measurement of transportation cost against standard industrial cost yardsticks; correct measurement of reduction in transportation costs.

(Enrollment only by approval of Instructor or Dean)

2½ semester hours credit

T 9-10 INTERSTATE COMMERCE COMMISSION PRACTICE AND PROCEDURE

A course designed to acquaint management levels in the transportation industry and in the industrial traffic departments of general industry with the responsibilities applicable to the regulation of transportation by the Federal Government; who must execute these responsibilities; the procedure by which they are carried out; history and content of Interstate Commerce Act and its impact upon all industrial activity; purpose and function of the Interstate Commerce Commission; training and preparation for the Interstate Commerce Commission Practitioners' Examination, including a study of important cases under the Commerce Clause of the Constitution; administrative law and procedure; ethics and general rules of practice.

(Prerequisite, T 1)

5 semester hours credit

T 11 MOTOR CARRIER OPERATIONS

Nature and characteristics of the motor carrier industry; types of motor carrier operations — common, contract, private, as well as local and over-the-road; regulation under the Motor Carrier Act of 1935; internal organization and administration, traffic management, terminal and garage operation; problems of revenue and cost, capital structure and financial management, selection, financing, maintenance, and replacement of equipment; industrial relations; safety and insurance; freight loss and damage claim; accounting, taxation and cost allocation; tariffs and classification; sales and public relations; trade associations and carrier rate conferences.

(Prerequisite, T 1)

2½ semester hours credit

T 12 MOTOR CARRIER TRAFFIC MANAGEMENT

This course deals with the administrative direction of the motor carrier as contrasted with the operational direction; the traffic manager as buffer between the carrier and the Interstate Commerce Act; co-operation with the sales department in the protection of the carrier's competitive position; general and special promulgation of carrier rates; bureau action and independent action; development of carrier's gross revenue structure; the relationship of the traffic manager to carrier ownership; line and staff functions supervised by the traffic manager; liaison between traffic, sales and operations from the traffic viewpoint.

(Prerequisite, T 11)

2½ semester hours credit

T 13 FREIGHT CLAIMS FOR LOSS AND DAMAGE

This course presents the practical procedure as well as the legal basis for handling loss and damage claims, including the bill of lading as a contract, development of common carrier liability; duties of consignee and carrier with regard to acceptance of damaged freight; preparation, filing and prosecution of freight claims; statute of limitations; damages, usual and unusual, as well as direct and indirect.

(Prerequisites, T 1, 2)

2½ semester hours credit

T 14-15 RATES AND TARIFFS

Technical treatment of tariff construction and use; structure of rates; the general rate level; procedure of filing; deviations from published tariffs and schedules; classification, exceptions, commodity rates, miscellaneous departures; changes in tariffs and classifications; the economic aspects of transportation rates.

(Prerequisites, T 1, 9-10)

5 semester hours credit

T 16 COMMERCIAL WAREHOUSING

Commercial warehousing has become an important and integrated element in the transportation of freight. This course stresses the possibilities and procedures for reducing the over-all transportation and distribution costs while providing improved service through intelligent selection and utilization of commercial warehousing facilities. It includes types of commercial warehouses and the function of each; commercial warehouse receipts as a method of short-term industrial finance; commercial warehousing as a natural economic method of price stabilization and market control; the legal aspects of commercial warehousing.

2½ semester hours credit

T 17 TRANSPORTATION ECONOMICS

This course looks beyond the mechanics of traffic management toward the more complete professionalization of the transportation executive, including the part played by transportation in the production process and the marketing process; transportation and the division of labor; the effect of transportation rates on prices and on the location of industry; carrier rate structure; the philosophy of public utility regulation; lawfulness and unlawfulness of carrier rates.

(Prerequisites, Ec 1-2, T 1, 2)

2½ semester hours credit

Application
Received by _____

Date _____

Northeastern University
UNIVERSITY COLLEGE

360 HUNTINGTON AVENUE, BOSTON 15, Mass.

APPLICATION FOR ADMISSION

Mr. _____
Mrs. _____
Miss _____

I (Print name in full) _____ (First) _____ (Middle) _____ (Last) _____

Date _____

hereby apply for admission to University College for the program designated.

- | | |
|---|--|
| <input type="checkbox"/> Commercial or Industrial Accounting Associate Degree Certificate | <input type="checkbox"/> In Accounting |
| <input type="checkbox"/> Public Accounting (C.P.A.) | <input type="checkbox"/> In Management |
| <input type="checkbox"/> Cost Accounting | <input type="checkbox"/> Credit & Financial Management Institute |
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Institute for Business & Professional Secretaries |
| <input type="checkbox"/> Credit and Financial Management | <input type="checkbox"/> Institute of Insurance |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Institute of Material Handling |
| <input type="checkbox"/> Insurance | <input type="checkbox"/> Institute of Retailing |
| <input type="checkbox"/> Marketing | <input type="checkbox"/> Institute of Traffic Management |
| <input type="checkbox"/> Material Handling | <input type="checkbox"/> Labor Relations Institute |
| <input type="checkbox"/> Office Management | <input type="checkbox"/> Office Management Institute |
| <input type="checkbox"/> Personnel and Industrial Relations | <input type="checkbox"/> Production Management Institute |
| <input type="checkbox"/> Production Management | <input type="checkbox"/> Quality Control Institute |
| <input type="checkbox"/> Real Estate | <input type="checkbox"/> Real Estate Institute |
| <input type="checkbox"/> Retailing | |
| <input type="checkbox"/> Transportation and Traffic Management | |
| <input type="checkbox"/> Industrial Technology | |
| <input type="checkbox"/> Liberal Arts and Management | |

B.S.
Degree

Single Courses only: ☐ (List each course) _____

Home address: Street _____ City _____

State _____ Telephone _____

(OVER)

A fee of five dollars must accompany this application. Make checks, money orders, or drafts payable to Northeastern University. **This fee is not refundable.** This fee is included under the educational benefits of the G.I. Bill of Rights.

Date of birth.....Age.....yrs.....mos.
 Are you to take these courses under the G. I. Bill of Rights? ☐ Yes ☐ Single
☐ No ☐ Married
 Name and address of parents or guardian if under 21 years of age.....

I have attended, including other schools of the Northeastern University system, the following schools above grammar grade. List all junior and senior high schools, evening high schools, preparatory schools, colleges and universities (if attendance at a university, *designate school*).

NAME OF SCHOOL	LOCATION — CITY, STATE	Check Years Attended				Date Left	Date of Graduation	Degree if any
		1	2	3	4			

I request advanced standing credit for previous college work completed at (name of institution).....

For information relative to my character and general ability, I refer you to the following person who is not a student or relative:

Name.....Street.....

City.....State.....Occupation.....

I first learned of Northeastern University through.....

Following is the name and address of the person who recommended that I enter the University College.....

I am employed as indicated below.

Name and Address of Employer.....

My Position.....

NORTHEASTERN UNIVERSITY

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All Programs Are Open to Both Men and Women

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regarding any of the above schools or colleges, address

DR. GILBERT C. GARLAND, *Dean and Director of Admissions*
360 Huntington Avenue, Boston 15, Massachusetts, COngress 2-1100

**Northeastern University
360 Huntington Avenue
Boston, Massachusetts
Congress 2-1100**





NORTHEASTERN UNIVERSITY

College of Liberal Arts

EVENING SESSIONS

1-1962
BULLETIN

Boston 15, Massachusetts

Office Hours

JUNE 19, 1961 — AUGUST 18, 1961

Monday through Thursday8:30 A.M.—9:00 P.M.

Friday8:30 A.M.—5:00 P.M.

AUGUST 21, 1961 — JUNE 16, 1962

Monday through Friday8:30 A.M.—9:00 P.M.

Saturday8:30 A.M.—12:00 NOON

The office is closed on all legal holidays.

Gifts and Bequests

Northeastern University will welcome gifts and bequests for the following purposes:

(a) For its building program.

(b) For general endowment.

(c) For specific purposes which may especially appeal to the donor.

It is suggested that, when possible, those contemplating gifts or bequests confer with the President of the University regarding the University's needs before legal papers are drawn.

The legal name of the University is "Northeastern University." However, in the making of gifts and bequests to Northeastern, the following wording is suggested: "Northeastern University, an educational institution incorporated under the laws of Massachusetts and located in Boston, Massachusetts."

Interviews

Prospective students, or those desiring advice or guidance regarding any part of the school work or curricula, are encouraged to arrange for personal interviews with the Director or other officers of instruction. Career planning through competent guidance provides an understanding of professional requirements and develops that definiteness of purpose so vital to success.

ADDRESS

Director of Evening Courses

COLLEGE OF LIBERAL ARTS

NORTHEASTERN UNIVERSITY

360 Huntington Avenue, Boston 15, Mass.

*Telephone: C*ongress 2-1100

NORTHEASTERN UNIVERSITY

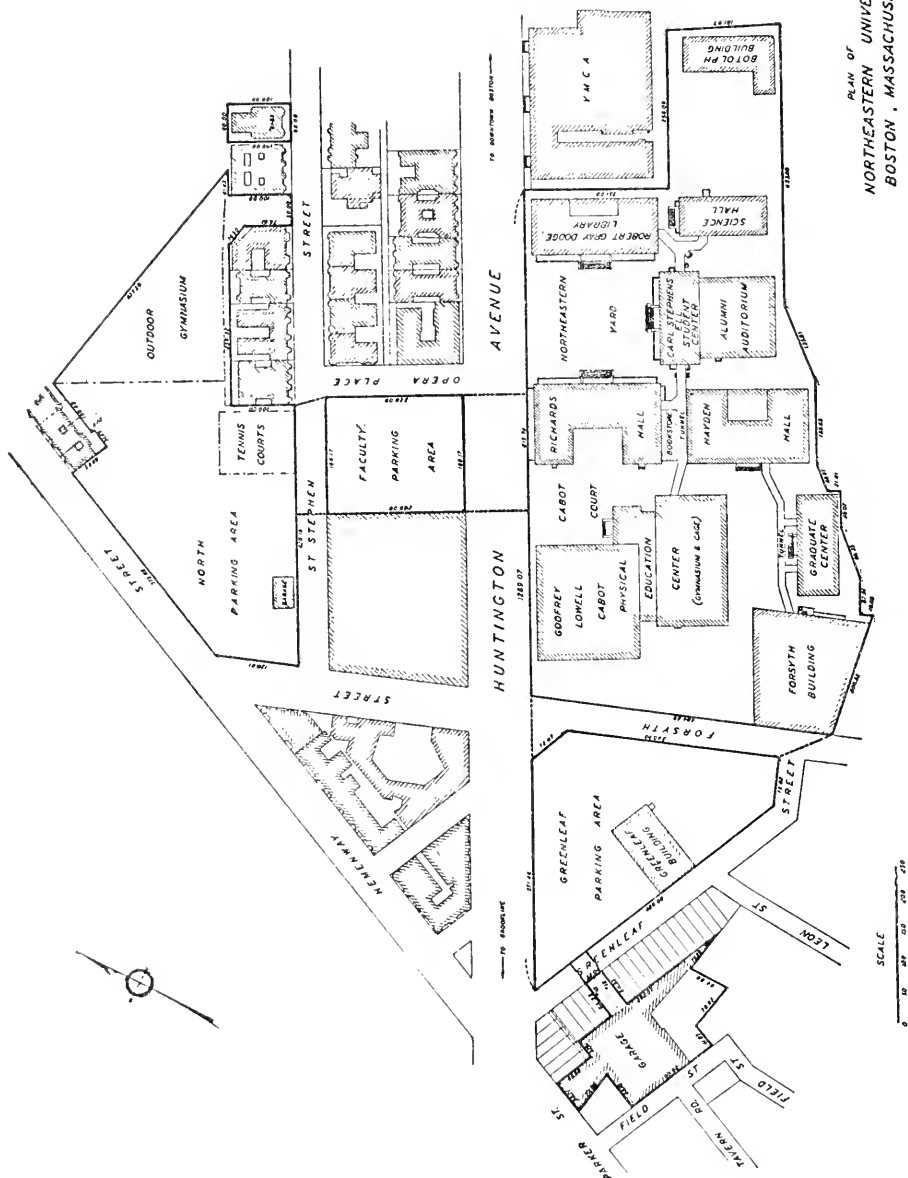
College of Liberal Arts

BULLETIN
OF EVENING COURSES
(COEDUCATIONAL)



The University is located at the entrance to the
Huntington Avenue subway within nine minutes of
Park Street and easily accessible from all points.





PLAN OF
NORTHEASTERN UNIVERSITY
BOSTON, MASSACHUSETTS

Calendar

1961

Summer session classes begin	June	19
Legal Holiday — No class sessions	July	4
Summer session classes end	Aug.	24
Fall semester classes begin	Sept.	8
Legal Holiday — No class sessions	Oct.	12
First term tests	Oct.	16-27
Legal Holiday — No class sessions	Nov.	11
Legal Holiday — No class sessions	Nov.	23
Second term tests	Nov. 27-Dec.	8
Final class session before Christmas recess	Dec.	21

1962

First class session after Christmas recess	Jan.	2
Final examinations, fall semester	Jan.	15-26
Spring semester classes begin	Jan.	29
Legal Holiday — No class sessions	Feb.	22
First term tests	March	5-16
Legal Holiday — No class sessions	April	19
Second term tests	April 9-18 and	26, 27
Legal Holiday — No class sessions	May	30
Final examinations — spring semester	June	4-15
Commencement Exercises	June	17
Summer session classes begin	June	18
Legal Holiday — No class sessions	July	4
Summer session classes end	Aug.	23

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ARNOLD E. HANSON, Ph.B., Ph.M., Ph.D.	Dean of University College
WILFRED S. LAKE, A.B., M.A., Ph.D.	Dean of Liberal Arts
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Physical Sciences
Newton High School
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Charlestown High School
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versity
Philosophy
- ROBERT L. WELLS, B.S., Tufts University; M.A., Boston University
Art
Northeastern University

Aims and Scope of the University

FOUNDED IN 1898, Northeastern University is incorporated as a privately endowed non-sectarian institution of higher learning under the General Laws of Massachusetts. The State Legislature by special enactment has given the University general degree granting powers. The University is governed by a Board of Trustees who are elected by and from the Northeastern University Corporation which is comprised of more than a hundred distinguished business and professional men.

From its beginning Northeastern University has had as its dominant purpose the discovery of community educational needs and the meeting of these in distinctive and serviceable ways. The University has not duplicated the programs of other institutions, but has sought to pioneer new areas of educational service.

A distinctive feature of Northeastern University is its Co-operative Plan, initiated by the College of Engineering in 1909 and subsequently adopted by the Colleges of Business Administration (1922), Liberal Arts (1935), and Education (1953). This serviceable educational method enables students to gain valuable practical experience as an integral part of their college programs and also provides the means by which they may contribute substantially to the costs of their education. The plan has been extended to the graduate level in several fields of engineering in co-operation with industrial corporations located throughout the United States.

In the field of adult education programs of study have been developed to meet a variety of needs. Since 1906 evening curricula have been offered leading to the bachelor's degree in business and carefully planned to serve mature students who are employed full time during the day but who are desirous of broadening their educational background by part-time study. Similar evening programs in the arts and sciences, in engineering, and in teacher education have been added in recent years. All formal courses of study leading to degrees through evening programs are approved by the appropriate college faculty and are subject to the same quantitative and qualitative standards as the regular day curricula.

The following is a brief outline of the aims and scope of the University's programs.

I. The Five Colleges

1. The College of Liberal Arts

The College of Liberal Arts offers majors in the usual fields of the arts and sciences leading to the degrees of Bachelor of Arts and Bachelor of Science. With the exception of pre-professional programs, day curricula are normally five years in length and operated on the Co-operative Plan. In all majors except chemistry and physics, however, qualified students with the approval of the dean may elect to complete requirements for the degree on a full-time plan in four years.

The College also offers a number of its courses during evening hours, constituting a program leading to the Bachelor of Arts degree with curricula in economics, English, history and government, and sociology.

2. The College of Education

The College of Education offers the option of study on the conventional four-year full-time plan or on the five-year Co-operative Plan which provides for a period of teacher-internship in various school systems of the greater Boston area. Both programs lead to the degree of Bachelor of Science in Education and are designed particularly to meet the needs of high school graduates who desire to prepare themselves for teaching or administrative positions in elementary and secondary schools.

3. The College of Business Administration

The College of Business Administration offers programs of study in the principal fields of business leading to the degree of Bachelor of Science in Business Administration. The programs are offered on the five-year Co-operative Plan under which students gain substantial practical experience in the fields for which they are preparing as an integral part of their undergraduate course of study.

4. The College of Engineering

The College of Engineering offers five-year co-operative curricula in civil, mechanical, electrical, chemical, and industrial engineering leading to the degree of Bachelor of Science with specification according to the engineering department in which the student qualified.

The College also offers during evening hours a full program leading to the degree of Bachelor of Science in Electrical Engineering. This program extends over nine years, covers the identical courses given in the day co-operative curriculum, and meets the same qualitative and quantitative standards of scholarship.

5. University College

University College, so called because it draws upon the resources of the other Colleges of the University, offers courses of study leading to certificates, associate degrees, or to Bachelor of Science degrees with specification of field of concentration. Programs of the College are designed specifically to meet the needs of older, more mature students who wish to undertake part-time programs of education during evening hours. Although it is exclusively an evening College, the quality standards of instruction and the requirements for its degree are wholly consistent with those of the other Colleges of Northeastern University. University College does not duplicate the offerings of the Colleges of Liberal Arts, Business Administration, Education, and Engineering, but provides curricula which cut across traditional subject matter areas and meet the particular needs of adults desiring formal programs of professional development on a part-time basis.

II. The Graduate School

The Graduate School of the University offers day and evening programs of study leading to appropriate master's degrees in the fields of arts and sciences, education, business, and engineering. Some of these programs are offered on the Co-operative Plan; others provide teaching and research fellowships for able candidates. Administrative headquarters for all graduate programs are located on the first floor of the Graduate Building where the offices of the dean and of the several directors of professional programs are located.

III. Lincoln Institute

Lincoln Institute offers evening programs of study in several fields of science and engineering technology leading to the degree of Associate in Science or Associate in Engineering. The courses of study are of college grade and cover much of the technical subject matter customarily included in schools of engineering, but the curricula are less extensive in scope than those required for the baccalaureate degree in engineering. They prepare students to work with professional engineers in various technical capacities.

IV. Adult and Continuing Education

The Office of Adult and Continuing Education provides special programs and services for the business and industrial community. These include programs in management development, seminars, conferences, institutes, and forums designed to communicate information about current trends in various areas. The Office also sponsors a Bureau of Business and Industrial Training which sets up both off campus and on campus, short-term, noncredit courses to meet the specific training needs of industrial organizations in New England.

V. Research Activities

The Faculty of the University are engaged upon a wide variety of basic research projects in business, science, social science, and engineering. These are co-ordinated by the Dean of Research Administration whose services are University wide and available to the Faculties of all the Colleges.

Although Northeastern is primarily concerned with undergraduate and graduate instruction in the areas of arts and sciences, business, engineering, and teacher education the University believes that the most effective teaching and learning takes place in an environment characterized by research activities directed toward extending the frontiers of knowledge.

Buildings and Facilities

University Buildings

Location

Northeastern University is located on Huntington Avenue in the Back Bay section of Boston. The main administrative offices of the University are located in Richards Hall.

The chief railroad centers of Boston are the North and South Stations. To reach the University from the North Station, board an MTA subway car going to Park Street and transfer there to any Huntington Avenue car. To reach the University from the South Station, board a Cambridge-bound subway train and transfer at Park Street to a Huntington Avenue car. The "Northeastern" station is the first stop outside the subway.

Huntington Avenue Campus

The principal educational buildings of Northeastern University are located on a sixteen-acre site in the Back Bay section of Boston. Only one block to the west of the University lie the famous Boston Museum of Fine Arts and the beautiful public gardens-park reservation known as "The Fenway." A map of the Huntington Avenue Campus is shown on page 2 of this catalog.

Following a long-range development plan, University facilities have expanded substantially in recent years. In addition to the seven buildings constructed within the last two decades, several modernized older buildings are available for specialized uses. The newer buildings on the campus are interconnected by means of tunnels, so that the students may go from building to building without going out of doors in inclement weather.

In addition to classrooms and instructional offices, the principal buildings include the following:

Botolph Building — Civil Engineering laboratories

Forsyth Building — Industrial and Mechanical Engineering laboratories

Greenleaf Building — ROTC headquarters, research facilities

The Robert Gray Dodge Library — Library, drawing rooms

Science Hall — Chemical Engineering and Biology laboratories

The Carl Stephens Ell Student Center — Student Activities, chapel, auditorium, and University Commons

Richards Hall — Administrative offices, Mechanical Engineering, Psychology and Chemistry laboratories, bookstore

The Godfrey Lowell Cabot Physical Education Center — Gymnasium, cage, rifle range

Hayden Hall — Evening Division offices, Business, Education, and Electrical Engineering laboratories, art studio

Graduate Center — Administrative offices of the Graduate School, Physics laboratories and cafeteria

The College of Liberal Arts

Aims

IN PROVIDING the means to a modern liberal education, the College of Liberal Arts of Northeastern University has a threefold objective: first, the development of intellectual capability; second, the development of a well-rounded personality; and third, preparation for a vocation.

Intellectual capability rests upon the foundation of a sound general education. Through the required and elective courses of all curricula, students are guided toward a mastery of the leading ideas, significant facts, and the habits of thought and methods of work in the areas of language, natural science, social science, and the humanities. With this training the student will better understand the world and society in which he lives, appreciate more fully the basic values upon which civilization and culture rest, and perceive and accept his responsibilities as an active participant in social groups—the family, the community, the nation and the world. At the same time the student is aided in the development of a resourceful and independent mind, the ability to use as well as to accumulate knowledge, and the awareness of his mental strengths and weaknesses.

The College of Liberal Arts endeavors to assist each student in attaining the goal of an emotionally balanced, well-rounded personality. Its academic and extra-curricular programs provide experiences conducive to the development of strength of character and a sense of personal responsibility—including such personal qualities as self-reliance, integrity, perseverance, and the ability to work with others.

Since liberal arts colleges were originally established for the purpose of training for certain professions, the College of Liberal Arts holds that there is no inconsistency between a truly liberal education and preparation for a vocation. Today it is widely accepted that a liberal education must prepare both for the art of living and the obtaining of a living.

Methods

To enable each student to plan a college program in keeping with his own interests and aptitudes, a wide range of electives is offered. This does not mean that students are free to elect courses indiscriminately, for if they are to obtain a liberal education they must have training in several basic fields. Therefore, the Faculty Committee on Education has established basic minimum requirements in each of several fields. These distribution requirements are outlined with each of the program offerings.

Admission Requirements

All applicants whose credentials are approved by the Committee on Education, are admitted as regular or special students pending matriculation. A non-returnable ten dollar fee, payable to Northeastern University, should accompany the application.

Regular Students

Applicants for admission as regular students must qualify by graduation from an approved course of study in an accredited secondary school. The following subjects are, generally, prescribed as entrance requirements:

<i>Subject</i>	<i>Units</i>
English (4 years)	3
Foreign language (2 years)	2
Mathematics (at least 1 year)	1
Science (at least 1 year)	1
Other college preparatory subjects	4
Electives, not more than	4
	—
	15

Matriculation as a Degree Candidate

The procedure of formal matriculation as a degree candidate may be deferred to provide the student an opportunity to:

- (1) Become adjusted to the conditions of evening study.
- (2) Acquire the self-discipline necessary for successful scholastic achievement.
- (3) Demonstrate to the satisfaction of the Committee on Education his ability to meet the standards established for all degree recipients.

This may be accomplished by successful completion of the College Board Entrance Examinations or, in the case of students who have been out of high school three or more years, by completion of a battery of tests at the Testing and Counseling Center of the University. A student may not register for courses beyond 30 semester hours of credit unless he has matriculated as a degree candidate.

When the student is ready to apply for matriculation, as outlined above, he will petition the faculty. Arrangements for testing will be made by the student with the University Testing and Counseling Center only after his petition has been approved.

Special Students

Applicants whose needs and interests can be best served through enrollment in one or more courses or in a certificate program may be admitted as special students provided they satisfy the admission requirements for the regular students or the equivalent in training and experience as evidence of their probable success and their ability to profit by the courses.

Registration

Before attending classes, students must report to the Administrative Offices for registration. Registrations will be accepted beginning May 15th for the following school year. Upper-class students will have their programs checked for the following academic year. Registration may be effected by mail.

Applicants are requested to register during the summer months to lessen the congestion during the opening week. No student will be allowed to register for any course after the second session without special permission from the Director.

A schedule of classes may be obtained by applying at the Administrative Office.

Advanced Standing

Advanced standing credit in the school may be obtained in one or both of two ways as follows:

By Transfer of Credit. Subject to the approval of the Committee on Education, credit may be given for work completed in other approved schools, colleges and universities. An applicant desiring credit by transfer should indicate his desire at the time of filing his application for admission. The applicant should instruct the Registrar of the institution of previous attendance to mail an official transcript direct to the College of Liberal Arts—Evening Sessions, indicating honorable dismissal, courses completed, credits and grades. A copy of the catalog of the institution from which the transfer is sought should accompany the application for advanced standing credit.

By Examination. 1. For credit: No advanced standing credit is awarded except for work previously completed in courses comparable to those offered at Northeastern University. Credit may be disallowed for work previously completed due to the remoteness of the time of study. These applicants, however, will be granted the privilege of taking an examination for credit.

2. For placement: Applicants who, as a result of previous training and experience, may be considered to possess sufficient knowledge of a subject will be allowed the privilege of taking a special examination in particular courses. No credit will be allowed but they will be granted the privilege of substituting another course.

The grade of B must be obtained in examinations for placement or for credit.

Residence Requirement

Every candidate for the Baccalaureate or Associate Degree must fulfill the residence requirement. The residence requirement is defined as the taking and satisfactory completion at Northeastern University, immediately preceding graduation, of 30 consecutive semester hours of work in courses; with the further provision that at least 10 of the 30 semester hours must be in the candidate's major field. Students whose attendance in degree programs is interrupted for a period of one year or more will be reinstated into the program in effect at the time of their re-entry into the College of Liberal Arts.

In the case of students who for causes beyond their control move outside of the reasonable commuting area of the school, and who have completed 100 or more semester hours of credit in courses, the Committee on Education will entertain a petition to allow them the privilege of completing their degree requirements at some other approved school. Under no circumstances will a degree be awarded to any student who has completed less than 30 semester hours of credit in courses at Northeastern University.

Quality Requirement

An average grade of C is required for graduation.

Graduation with Honor

Candidates who have achieved distinctly superior attainment in their academic work will be graduated with honor. Upon special vote of the faculty a limited number of this group may be graduated with high honor or with highest honor. To be considered for graduation with honor a student must have completed a minimum of sixty semester hours of work at Northeastern University. Courses credited by advanced standing will be eliminated in determining honor graduates.

Attendance at Commencement

All candidates for a first degree (bachelor or associate) are required to attend Commencement in the year of qualification. First degrees in absentia are awarded only to candidates excused for personal or immediate-family illness, military service, or employment obligations beyond the control of the candidate.

A petition to receive a degree in absentia must be presented to the dean of the school or college in which the candidate qualifies. Each petition will be acted upon by the academic dean involved, the candidate having the privilege of appeal to the Provost.

General Information

The Academic Year

The courses which comprise the several degree curricula described on pages 28 to 31 are offered through the College of Liberal Arts.

The academic year for the evening sessions of the *College of Liberal Arts* comprises the fall and spring terms of twenty (20) weeks each and a ten (10)-week summer term. The courses are offered every evening throughout the week with classes scheduled for 6:40 to 8:05 and from 8:15 to 9:40. The starting and closing dates for the three terms are shown on the calendar on page 3.

Certain courses offered by other colleges in the University may be taken when they further the objectives of the student's program. Prior approval of the Dean must be obtained in each case. Tuition and other fees for such courses are charged at the rate in effect in the college offering the courses.

The Student Body

The character of a student body determines the standards which a school can maintain. Nothing is more essential to the success of an educational institution than a careful selection of incoming students. This principle applies just as readily to an evening school as to a day school. Standards are invariably adjusted to the average intelligence of the students. Northeastern University College of Liberal Arts maintains standards of admission which result in a student body capable of pursuing work of standard college grade during evening hours.

The student body currently consists of men and women of widely varied ages and occupations. The youngest student is 17 years of age and the oldest 72 years. The average age is 27 years.

The students, about evenly divided between men and women, have realized that if they are to increase their earning power they must prepare themselves for advancement. The training offered by the University has enabled the students to improve their earning capacities and enlarge their responsibilities. Further, most of the students realize that the broad liberal arts training is an aid to effective living in a complex society.

Attendance

Attendance is required of all students at recitations and lectures continuously throughout the academic year.

No student, who has been present at less than seventy per cent of the lectures, will be permitted to take a final examination in a course. To be entitled to attendance credit, a student must be present at least one hour in a one and one-half hour lecture.

Outside Preparation

It is expected that students will devote on the average two hours to preparation for each hour spent in the classroom. It is to be expected that some courses will require more time for preparation than others.

Students are cautioned therefore to limit their registration to that course load for which they can be certain to spend required time. There is neither sense nor satisfaction in mediocre achievement.

Notify the Office Immediately

Of change of address.

Of withdrawal from any course.

Of withdrawal from the school, giving date of the last session attended.

Term Tests

Two tests are regularly scheduled in each semester for all courses. These tests are regarded as part of the term or course work. Students failing to take the term tests for justifiable reasons may petition for a make-up privilege *within one week of the date of the test*. Make-up privilege will not be allowed to any student merely for the purpose of raising his test grade. A fee of \$3.00 is charged for each make-up test.

Final Examinations

The general policies governing regular examinations are:

A final examination will be held at the end of the semester in each course unless an announcement to the contrary is made.

The minimum passing grade in a regular final examination is D.

Students who, for justifiable reasons, are unable to take a final examination may be allowed the privilege of a make-up examination upon petition to the Dean. This examination will be considered as the original examination for grading purposes. The fee for each make-up examination is \$5.00.

The student who has received a grade in a final examination and in a course may not take another examination for the purpose of raising his grade unless he repeats the course in its entirety.

Make-up Examinations

The following policies govern re-examination:

Permission for taking a make-up examination is dependent upon the quality of the work which the student has done throughout the course and is a privilege which the Committee on Education may grant to students who have received an Incomplete (Inc.).

The make-up examinations are given on specified dates. Students will be notified by the school office of the specific dates of each examination.

A make-up examination for purposes of removing an incomplete grade must be taken within the next school year.

Grades and Credits

The following system of grading is in use:

Superior Work, A; Above Average Work, B; Average Work, C; Lowest Passing Grade, D; Failure, F; Incomplete, Inc.

Quality Points

The requirement for graduation from the College of Liberal Arts is 130 semester hours with attainment of a quality point average of 2.0. Although the credits allowed for acceptable work completed elsewhere by transfer students count towards fulfilment of quantitative graduation requirements, neither the credits nor the grades earned in such courses are included in quality point computations for graduation.

The method of figuring quality points is as follows: Each semester course of A grade is multiplied by 4, B grade by 3, C grade by 2, D grade by 1, and F grade or Incomplete by 0. The total number of quality points, divided by the total number of semester courses carried, shall be the quality point average.

Students receiving an F grade in a course must repeat the course in its entirety including term work, examinations, and attendance.

The policy is followed of mailing all grade and status reports to students instead of issuing these reports at the school office or over the telephone.

Credit for a full year course is contingent upon satisfactory completion of both semesters. Credit for one-half of a full year course is given only upon approval by the Director.

Probation and Discipline

The Committee on Education, in dealing with students whose work in the school may be unsatisfactory, or whose conduct is such as to make it inadvisable for them to continue as members of the student body, considers each case upon its individual merits. The following general principles are kept in mind in handling such cases:

Students whose scholarship in any given year is unsatisfactory may be dropped from the school or may be placed on probation.

When a student is placed on probation, the probation is formally imposed for a definite time and can only be extended by approval of the Committee on Education.

This Committee has the authority to dismiss from the school or place on probation at any time or to strike off from the list of candidates for the degree any student whom it may deem unworthy either on account of unsatisfactory scholarship or for any great defect of conduct or character. The Committee may ask any student to withdraw from the school who is obviously out of sympathy with the aims and ideals of the school.

Classrooms and Libraries

The classrooms are furnished with modern equipment and are thoroughly adapted to evening school work. Improvements in classroom facilities are constantly being made to meet the needs of the student body.

The reading rooms of the Library are open Monday through Friday from 8:15 a.m. to 10:00 p.m. They close at 4:00 p.m. on Saturdays and are not open Sundays and holidays.

Textbooks and Supplies

The Northeastern University Bookstore is a department of the University and is operated for the convenience of the student body. All books and supplies which are required by the students for their work in the University may be purchased at the Bookstore. In addition, the Bookstore also carries a large number of general supplies.

Student Council

The social and extracurricular life of the school is in charge of the Student Council consisting of representatives from each class or school group. In addition to arranging for occasional social affairs, special lectures, and meetings, the Council represents the interests of the student body. The faculty and the officials advise with the Council in regard to school policies.

Tuition, Fees and Scholarships

General Financial Information

Tuition and fees are not transferable and are refundable only as stated under "Refund of Tuition."

Checks and drafts for all charges are to be drawn to the order of Northeastern University.

Students are not permitted to attend class sessions or take any examinations or tests until they have paid their tuition fees or have made satisfactory arrangements for payments.

Students will not be advanced in class standing, or permitted to re-enroll in the University, nor will degrees be conferred until all financial obligations to the University have been met.

No certificate of honorable dismissal will be issued to any student who has not fully met his financial obligations to the University.

There are no auditors or auditor's rates in the College of Liberal Arts.

Application Fee

The application fee of \$10.00 must accompany the initial application for admission to the undergraduate programs of the College of Liberal Arts. This fee is non-refundable.

Tuition

Tuition for all credit courses is charged at the rate of eighteen dollars (\$18) per semester hour of credit. Charges for registration and tuition for special courses are at the rate and on the basis of payment specified for each course.

Students registering for courses in other schools of the University are charged the tuition rates and other fees effective in the departments in which they are enrolled.

Tuition for degree candidates for all credit courses is charged on the semester basis payable at the beginning of each semester.

Tuition for a special student registered in a special course is charged for the entire course and is payable in a single payment at the beginning of the course unless otherwise arranged.

Occasionally situations develop—usually beyond the control of the student—which make it difficult to meet the payments in the manner outlined above. Under such circumstances the student is advised to discuss his problem personally with the Bursar's Office where a deferred payment agreement or one of the budget plans may be worked out. Such arrangements should be made before the end of the first week of the semester or within one week of the date of registration if the student enters late. Failure to take immediate action will result in a late payment fee.

Tuition Budget Payment Plans

Schedule of Tuition Payments Calculated on a Semester Basis

		PLAN A	PLAN B	PLAN C
		12 S.H. Course Load	8 S.H. Course Load	6 S.H. Course Load
Payment	Dates	Payments	Payments	Payments
<i>First Semester</i>	Sept.	*\$56	*\$38	*\$29
	Oct.	54	36	27
	Nov.	54	36	27
	Dec.	54	36	27
<i>Second Semester</i>	Jan.	*56	*38	*29
	Feb.	54	36	27
	Mar.	54	36	27
	April	54	36	27

*Includes a non-refundable service charge of \$2.00.

Tuition Underwritten by Employers

An increasing number of companies are underwriting in part or whole the cost of tuition of students in their employ. In such cases the student must furnish at the time of registration, or immediately thereafter, a purchase order covering his registration or a statement from an officer of his company certifying that the company is underwriting the tuition.

Late Payment Fee

Bills for tuition and fees are payable on or before Saturday of the week of issuance. A Late Payment Fee of \$2.00 is charged for all students failing to comply unless special payment arrangements are approved by the Bursar's Office.

General Fees

A fee of \$3.00 is charged for each make-up test, \$5.00 for each make-up final examination or advanced standing examination. This fee must be paid at the time of filing a petition for the make-up privilege.

The University graduation fee, charged all students receiving the Bachelor or Associate degree, is \$20.00, payable on or before May 1st of the year in which the student expects to graduate.

Statement of Tuition Refund Policy

The University provides all instruction and accommodations on an academic semester basis; therefore, no refunds are granted except in cases where students are compelled to withdraw on account of personal illness or other reasons beyond their control. In no event will a refund be made if an individual's attendance is recorded beyond the fifth class session. A student must complete an official withdrawal application before being considered for refund. Questions regarding refunds should be discussed with the Bursar's Office.

The College of Liberal Arts

Programs of Instruction

To achieve the aims established for the Evening Programs in Liberal Arts, of serving men and women who are engaged in full-time employment during the day, the College offers curricula leading to the baccalaureate and associate degrees, and Institute programs in which certificates are awarded. The various individual courses of study are outlined on the following pages of this catalog. Course descriptions are included by departments beginning on page 34.

The Bachelor of Arts Degree

Major fields of study are offered in Economics, English, History-Government, and Sociology. Each student will choose a minor field in consultation with the Director of evening sessions of the College of Liberal Arts.

The distribution requirements, including certain required courses, are shown with each curriculum. Upon petition, students may be permitted in certain cases to substitute other courses which will more adequately serve their specific vocational objectives.

Each curriculum normally provides for not less than 130 semester hours of work, including at least 30 semester hours of advanced work in a major field, and at least 15 semester hours of prescribed or elective courses in a related minor field.

All candidates for a degree must have satisfactorily completed in college one year of a modern language above the elementary level.

No student transferring from another college or university is eligible to receive a degree until at least 30 semester hours of academic work have been completed at Northeastern University immediately preceding graduation.

The suggested curricula indicate that the degree requirements may be completed in six academic years. Many students, however, will find it advisable to spread their academic loads either by taking courses during the summer or by extending their programs over a longer period.

See pages 28 through 31 for available curricula.

The Associate in Arts Degree

The program leading to the Associate Degree is offered for those who are desirous of obtaining a general cultural background in the liberal arts and humanities, but who do not wish to pursue a major field of concentration for the baccalaureate degree.

Candidates for the Associate in Arts degree must complete a minimum of 72 semester hours of credit. This is approximately one-half of the requirements (130 semester hours) for the Bachelor of Arts degree.

To provide a balanced program which will achieve the established objectives, the faculty has set minimum credit requirements in the several areas of study as follows:

Distribution Requirements

	<i>Sem. Hrs</i>
Economics	4
English	12
Fine Arts	4
Government	6
History	8
Philosophy	4
Psychology	4
Science	6
Sociology	4
Other Elective Courses.....	20
	—
TOTAL	72

These requirements can be completed by class attendance three evenings a week for three academic years of forty (40) weeks each. In many cases it will be advisable in the interest of the particular student involved to satisfy the requirements by attendance over a longer period. On the other hand, attendance during the Summer Term will make it possible to shorten the length of time, or at least distribute the course load more evenly over the entire calendar year. For complete information regarding the academic calendar, see page 3.

Liberal Arts and Management

There are several areas of employment which require as preparatory training a natural combination of liberal arts with management courses. To meet this need the College of Liberal Arts offers in conjunction with University College a program leading to the degree of Bachelor of Science.

The degree requires satisfactory completion of 58 semester hours of credit in management courses plus 72 semester hours of credit in the field of liberal arts. The several options are outlined on the pages indicated:

	<i>Page</i>
Personnel and Industrial Relations	32
Administrative	32
Sales	32

The Bachelor of Science Degree with Education Minor

To meet the need for qualified teachers, particularly for the secondary level, the College of Liberal Arts, in conjunction with the College of Education and University College, offers a program leading to the Degree of Bachelor of Science.

The degree requires satisfactory completion of prescribed liberal arts core courses; a number of professional education courses in methodology and the student teaching which are required for certification as a secondary school teacher; and a major field of concentration in English or social studies.

The detailed program is outlined on page 33.

Economics

Leading to the Degree of Bachelor of Arts

The program of instruction includes: semester hours

CORE COURSES — required68

Economics:

†Ec1-2 ECONOMIC PRINCIPLES AND PROBLEMS 4

English:

E1-2 ENGLISH 4

Fine Arts: *Courses approved by the Director 4

Government: AMERICAN GOVERNMENT 4

G1-2 *Courses approved by the Director 4

History: HISTORY OF CIVILIZATION 8

H1-4 *Courses approved by the Director 4

Literature: INTRODUCTION TO LITERATURE 2

E3 *Courses approved by the Director 8

****Modern Language:**

ELEMENTARY 4

INTERMEDIATE 4

Philosophy:

Ph1-2 INTRODUCTION TO PHILOSOPHY 4

Psychology:

Ps1-2 GENERAL PSYCHOLOGY 4

Science:

Sc1 SURVEY OF PHYSICAL SCIENCES 3

Sc2 SURVEY OF BIOLOGICAL SCIENCES 3

Sociology:

SI-2 PRINCIPLES OF SOCIOLOGY 4

MAJOR CONCENTRATION COURSES — required30

†A30-31 MANAGERIAL ACCOUNTING 4

†Ec3-4 FINANCING BUSINESS OPERATIONS 4

†Ec5-6 FINANCIAL POLICIES AND PLANNING 4

†Ec11 ECONOMIC GEOGRAPHY 2½

†Ec12 GOVERNMENT CONTROLS IN BUSINESS 2½

†Ec20-21 STATISTICS I AND II 4

†Ec30 INTERNATIONAL ECONOMICS 2½

†Ec31 MANAGERIAL ECONOMICS 2½

*ECONOMIC THEORY COURSES 4

MINOR CONCENTRATION COURSES*** — required15

ELECTIVE COURSES17

†Courses taken through University College.

*Courses approved by the Director — Students will consult with the Director or other qualified administrative personnel before registering for any courses not specified within the curriculum.

**One full year of a Modern Language is required beyond the Elementary level as a requirement for graduation.

***A minor consisting of a minimum of 15 semester hours of credit in a related field will be selected by the student in consultation with the Director.

English

Leading to the Degree of Bachelor of Arts

The program of instruction includes:

semester hours

CORE COURSES — required.....68

Economics:

†Ecl-2 ECONOMIC PRINCIPLES AND PROBLEMS 1

English:

E1-2 ENGLISH 1

Fine Arts:

*Courses approved by the Director 4

Government:

AMERICAN GOVERNMENT 4

G1-2 *Courses approved by the Director 4

History:

HISTORY OF CIVILIZATION 8

H1-4 *Courses approved by the Director 4

Literature:

E3 INTRODUCTION TO LITERATURE 2

E21-22 WESTERN WORLD LITERATURE I 4

E23-24 WESTERN WORLD LITERATURE II 4

**Modern Language:

ELEMENTARY 4

INTERMEDIATE 4

Philosophy:

Ph1-2 INTRODUCTION TO PHILOSOPHY 4

Psychology:

Ps1-2 GENERAL PSYCHOLOGY 4

Science:

Sc1 SURVEY OF PHYSICAL SCIENCES 3

Sc2 SURVEY OF BIOLOGICAL SCIENCES 3

Sociology:

S1-2 PRINCIPLES OF SOCIOLOGY 4

MAJOR CONCENTRATION COURSES — required30

E4 ADVANCED COMPOSITION 2

E8 THE ENGLISH LANGUAGE 2

E9 INTRODUCTION TO SEMANTICS 2

E25 ENGLISH LITERATURE TO 1800 2

E26 ENGLISH LITERATURE SINCE 1800 2

E27 AMERICAN LITERATURE TO 1860 2

E28 AMERICAN LITERATURE SINCE 1860 2

E31-32 CHAUCER *or* 4

E33-34 SHAKESPEARE 4

E35-36 RESTORATION AND 18TH CENTURY ENG. LIT. *or* ... 4

E37-38 ROMANTIC POETS OF THE 19TH CENTURY 4

E41 ENGLISH DRAMA *or* 2

E52 AMERICAN DRAMA 2

The remaining six hours must be taken from the following courses:

E39-40 THE ENGLISH NOVEL 4

E50 THE AMERICAN SHORT STORY 2

E51 THE AMERICAN NOVEL 2

E53 CONTEMPORARY AMERICAN POETRY 2

E54 MODERN AMERICAN NOVEL 2

MINOR CONCENTRATION COURSES*** — required15

ELECTIVE COURSES17

†, *, **, *** — For explanation see bottom of page 28.

History-Government

Leading to the Degree of Bachelor of Arts

The program of instruction includes:

semester hours

CORE COURSES — required.....68

Economics:

†Ecl-2 ECONOMIC PRINCIPLES AND PROBLEMS 4

English:

E1-2 ENGLISH 4

Fine Arts:

*Courses approved by the Director 4

Government:

G1-2 AMERICAN GOVERNMENT 4

G3-4 COMPARATIVE GOVERNMENT 4

History:

H1-4 HISTORY OF CIVILIZATION 8

H9 THE UNITED STATES TO 1865 2

H10 THE UNITED STATES SINCE 1865 2

Literature:

E3 INTRODUCTION TO LITERATURE 2

E27 AMERICAN LITERATURE TO 1860 2

E28 AMERICAN LITERATURE SINCE 1860 2

E25 ENGLISH LITERATURE TO 1800 2

E26 ENGLISH LITERATURE SINCE 1800 2

****Modern Language:**

ELEMENTARY 4

INTERMEDIATE 4

Philosophy:

Ph1-2 INTRODUCTION TO PHILOSOPHY 4

Psychology:

Ps1-2 GENERAL PSYCHOLOGY 4

Science:

Sc1 SURVEY OF PHYSICAL SCIENCES 3

Sc2 SURVEY OF BIOLOGICAL SCIENCES 3

Sociology:

S1-2 PRINCIPLES OF SOCIOLOGY 4

MAJOR CONCENTRATION COURSES — required30

H11 RECENT AMERICAN HISTORY 2

H13 ENGLISH CONSTITUTIONAL HISTORY 2

H14 AMERICAN CONSTITUTIONAL HISTORY 2

H19-20 ENGLISH HISTORY 4

H21 MODERN EUROPEAN HISTORY *or* 2

H22 RECENT EUROPEAN HISTORY 2

H32 CONTEMPORARY MIDDLE EAST *or* 2

H31 CONTEMPORARY AFRICA 2

H29 CONTEMPORARY LATIN AMERICA 2

H35-36 HISTORY OF RUSSIA TO 1917 *or* 4

H23-24 RUSSIA SINCE 1917 *or* 4

H27 MODERN INDIA 2

H28 MODERN CHINA AND JAPAN 2

G19 MODERN POLITICAL THEORY 2

G15 AMERICAN FOREIGN POLICY 2

G11-12 INTERNATIONAL RELATIONS *or* 4

G17-18 SOVIET FOREIGN POLICY 4

G13 CURRENT POLITICAL ISSUES *or* 2

G14 AMERICAN POLITICS AND POLITICAL PARTIES 2

MINOR CONCENTRATION COURSES*** — required15

†, *, **, *** — For explanation see bottom of page 31.

†, *, **, *** — For explanation see bottom of page 31.

Sociology

Leading to the Degree of Bachelor of Arts

The program of instruction includes:

semester hours

CORE COURSES — required.....68

Economics:

†Ecl-2 ECONOMIC PRINCIPLES AND PROBLEMS 4

English:

E1-2 ENGLISH 4

Fine Arts:

*Courses approved by the Director 4

Government:

G1-2 AMERICAN GOVERNMENT 4

History:

H1-4 HISTORY OF CIVILIZATION 8

*Courses approved by the Director 4

Literature:

E3 INTRODUCTION TO LITERATURE 2

*Courses approved by the Director 8

****Modern Language:**

ELEMENTARY 4

INTERMEDIATE 4

Philosophy:

Ph1-2 INTRODUCTION TO PHILOSOPHY 4

Ph7-8 PRINCIPLES AND PROBLEMS OF SOCIAL ETHICS 4

Psychology:

Ps1-2 GENERAL PSYCHOLOGY 4

Science:

Sc1 SURVEY OF PHYSICAL SCIENCES 3

Sc2 SURVEY OF BIOLOGICAL SCIENCES 3

Sociology:

S1-2 PRINCIPLES OF SOCIOLOGY 4

MAJOR CONCENTRATION COURSES — required30

S-3 SOCIAL PROBLEMS 2

S-4 SOCIAL DISORGANIZATION 2

S9-10 AMERICAN CULTURE 4

S13-14 JUVENILE DELINQUENCY 4

S15-16 CRIMINOLOGY 4

S17-18 SOCIAL SERVICE I AND II 4

S22 THE FAMILY 2

S23 RACE RELATIONS AND CULTURAL CONTACT *or* 2

S25 SOCIAL CONTROL 2

S24 URBAN SOCIETY 2

S30-31 SOCIAL THEORY 4

MINOR CONCENTRATION COURSES*** — required15

ELECTIVE COURSES17

†Courses taken through University College.

**Courses approved by the Director* — Students will consult with the Director or other qualified administrative personnel before registering for any courses not specified within the curriculum.

******One full year of a Modern Language is required beyond the Elementary level as a requirement for graduation.

*******A minor consisting of a minimum of 15 semester hours of credit in a related field will be selected by the student in consultation with the Director.

Liberal Arts and Management

A Combined Program Leading to the Degree of Bachelor of Science

The University recognizes the dual purpose of education: (1) to prepare the student to live a full and effective life, (2) to train him for earning his living. There are several areas of employment which require as preparatory training a natural combination of liberal arts with management courses.

To meet this need, The College of Liberal Arts, through its evening program, offers in conjunction with University College a curriculum leading to the degree of Bachelor of Science.

Degree Program

<i>Liberal Arts:</i>	<i>Sem. Hrs.</i>
Course credits totaling seventy-two (72) hours in one of the options listed below	72
<i>Management:</i>	
Course credits totaling fifty-eight semester (58) hours in an approved program	58
Total semester hours required for the degree	130

**OPTIONS*

<i>PERSONNEL AND INDUSTRIAL RELATIONS</i>	<i>Sem. Hrs.</i>	<i>SALES</i>	<i>Sem. Hrs.</i>
ENGLISH	4	ENGLISH	4
LITERATURE	8	LITERATURE	8
FINE ARTS	4	FINE ARTS	4
GOVERNMENT	6	GOVERNMENT	6
HISTORY	8	HISTORY	8
PHILOSOPHY	4	PHILOSOPHY	4
PSYCHOLOGY	12	PSYCHOLOGY	8
SCIENCE	6	SCIENCE	6
SOCIOLOGY	8	SOCIOLOGY	8
ELECTIVE COURSES	12	ELECTIVE COURSES	16

<i>ADMINISTRATIVE</i>	<i>Sem. Hrs.</i>
ENGLISH	4
LITERATURE	8
FINE ARTS	4
GOVERNMENT	6
HISTORY	8
PHILOSOPHY	4
PSYCHOLOGY	8
SCIENCE	6
SOCIOLOGY	6
ELECTIVE COURSES	18

*Specific courses to meet the requirements of the above options must be approved by the Director of evening sessions of the College of Liberal Arts or other qualified administrative personnel. Special programs will be arranged to meet the specific needs of the students.

The Bachelor of Science Degree with Education Minor

The program of instruction includes: semester hours

CORE COURSES — required60

Economics:

Ecl-2 ECONOMIC PRINCIPLES AND PROBLEMS 4

English:

E1-2 ENGLISH 4

Fine Arts:

Courses approved by the Dean 4

Government:

G1-2 AMERICAN GOVERNMENT 4

History:

H1-4 HISTORY OF CIVILIZATION 8

H9 THE UNITED STATES TO 1865 2

H10 THE UNITED STATES SINCE 1865 2

Literature:

E3 INTRODUCTION TO LITERATURE 2

E27 AMERICAN LITERATURE TO 1860 2

F28 AMERICAN LITERATURE SINCE 1860 2

Courses approved by the Dean 4

Philosophy:

Ph1-2 INTRODUCTION TO PHILOSOPHY 4

Psychology:

Ps1-2 GENERAL PSYCHOLOGY 4

Science & Mathematics (two of the following three courses).... 8

Sc1 SURVEY OF PHYSICAL SCIENCES

Sc2 SURVEY OF BIOLOGICAL SCIENCES

M3 BASIC COLLEGE MATHEMATICS

Sociology:

S1-2 PRINCIPLES OF SOCIOLOGY 4

Speech:

E10 EFFECTIVE SPEAKING 2

EDUCATION COURSES — required18

HUMAN DEVELOPMENT I AND II 4

LEARNING AND TEACHING I AND II 4

BACKGROUNDS OF AMERICAN EDUCATION 2

METHODS AND MATERIALS IN SECONDARY TEACHING 2

***STUDENT TEACHING AND RELATED SEMINAR 6

MAJOR CONCENTRATION COURSES — required30

English Majors will select courses with approval of the Dean....30

Social Studies Majors will select courses from Economics,
History, Government, and Geography with approval of
the Dean30

ELECTIVE COURSES22

Between the *Core* courses and the *Elective* courses each student will complete a Minor consisting of 15 semester hours approved by the Dean.

***This course will *not* be offered evenings. It will require 15 weeks full time.

Description of Courses

WHERE appropriate, a student may choose his program from the courses offered by the College of Liberal Arts or University College. Courses offered by University College are indicated by a (†) preceding the course title.

The University reserves the right to withdraw, modify, or add to the courses offered or to change the order of courses in curricula as may seem advisable. Not all courses are offered every year.

The University further reserves the right to withdraw in any year any elective or special course for which less than twelve enrollments have been received. Regular students so affected by such withdrawal will be permitted to choose some other course. In the case of special students, a full refund of all tuition and other fees will be made.

The University also reserves the right to change the requirements for graduation, tuition and fees charged, and other regulations. However, no change in tuition and fees at any time shall become effective until the school year following that in which it is announced.

The letter or letters immediately preceding the numbers indicate the classification of the course. All full-year courses will have mid-year examinations and course credit will not ordinarily be granted on a semester basis.

Accounting (A)

†A 30-31 *Managerial Accounting*—A study of the broad background of accounting and business transactions to enable the student to analyze and interpret intelligently financial statements and other accounting reports. The use of accounting in management and financial control is demonstrated. Topics covered are the development of accounting fundamentals, preparation of financial statements, corporation and manufacturing accounts, evaluation of balance sheet items, analysis and interpretation of financial statements and other trends, and the use of accounting as an aid to management.

(No previous knowledge of bookkeeping or accounting necessary)

4 semester hours credit

FOR OTHER COURSES IN THE ACCOUNTING AREA THE UNIVERSITY COLLEGE BULLETIN SHOULD BE CONSULTED.

Economics (Ec)

†Ec 1-2 *Economic Principles and Problems*—The study of our economic society, its institutions and their practices as essential prerequisites to the successful conduct of business affairs and to the development of intelligent citizenship. This course provides the significant economic principles and facts about industry, labor, money, banking, the distribution of income to the factors of production, business fluctuations, and forms of social organization. Consideration is given to current economic problems, in relation to the basic principles and laws, and to their implications for individuals, business, and government, as well as society at large.

4 semester hours credit

†Ec 3-4 *Financing Business Operations* — The needs for capital in the production and merchandising of goods and services; the sources of long-term and short-term funds and their utilization form the basis for the introduction to finance as a basic function of business management. Credit instruments, trade credit, secured and unsecured loans, specialized forms of short-term financing and consumer credit are considered in the first semester. Money, the commercial banking structure, the Federal Reserve System, thrift institutions and other financial agencies and services as they relate to operations of the business firm form the basis of the second semester, which concludes with brief consideration of both international and public finance.

(Prerequisites, Ec 1-2; A 30-31)

4 semester hours credit

†Ec 5-6 *Financial Policy and Planning* — This course includes a study of the corporate form of organization, the various types of securities utilized, and the financial problems involved in promotion and expansion of enterprises, in mergers, in sale of properties, and in failures and reorganizations. Attention is devoted to the planning aspects of the corporation financial officer's job with respect to budgets, operating reports and their analysis. Policy matters such as executive compensation, dividend policies, pensions and profit-sharing plans are also dealt with.

(Prerequisite, Ec 3-4)

4 semester hours credit

†Ec 7 *Investment Principles* — The characteristics of the entire range of securities from government bonds to common stocks form the foundation of this course as they relate to various types of investment programs. Sources of information, mathematics and mechanics of investment and the differing analytical approach to various industries are considered primarily from the viewpoint of the individual private investor interested in practical methods of capital preservation.

(Prerequisite, Ec 5-6)

2½ semester hours credit

†Ec 8-9 *Applied Security Analysis* — This course is designed to acquaint the student with methods used by practicing security analysts in their studies of various industries and to provide practical information useful in future analysis of companies, operating in these industries. It includes review of basic principles of Security Analysis; tools used by practicing analysts; analytical study of various industries comprising our economy, including the major consumer goods, capital goods, service industries, public utilities and railroads. Practicing analysts who are specialists in their respective industries will comprise the faculty. These instructors will develop the problems affecting their industries, the methods used in appraising their outlook, and the approaches to the problems of analyzing the securities of individual companies within these industries. A term paper is required of each student, during the preparation and writing of which he is assigned to a practicing analyst for technical assistance.

(Prerequisites, A 34; Ec 7)

5 semester hours credit

†Ec 10 *Management of Personal Finance* — The purpose of this course is to give help to young men and women with the financial problems they face in charting wise programs of handling their personal finances. It is introduced by a discussion of money, its function, dollar value, and an appreciation of true values in life, using money to achieve the same. The course continues with a consideration of the following: expense control through budgeting; wise buying methods and policies — charge accounts, installment buying; financial institutions for borrowing money; protection against risk to person and property; methods of saving; the place of life insurance in financial planning; owning a home; investing in securities; trust funds, investment trusts; making a will; business fluctuations and the planning of personal finances.

2½ semester hours credit

†Ec 11 *Economic Geography* — This course is concerned with the role of geography, geology, and climatology in determining the centers of population, the location of natural resources, and the development of agriculture and industry. It considers their location in terms of their natural relationship to the flow of world trade. The socio-economic principles that underlie the development of resources in different countries and climates are emphasized. It also analyzes the political-economic aspects of resource distribution and development in the form of trade and world relationship.

2½ semester hours credit

†Ec 12 *Government Controls in Business* — A study of the economic and political relationships which exist between business and government with particular reference to the Sherman Act and Anti-Trust Laws; Securities and Exchange Commission; Interstate Commerce Commission; regulation of public utilities; the Co-operative Movement; the Social Security Act; government and labor; business regulation by taxation.

(Prerequisite, Ec 1-2)

2½ semester hours credit

†Ec 20 *Statistics I* — The objective of this course is to introduce students with no previous training in statistics to its practical use in analyzing problems encountered in business and industry. It presents the fundamental concepts underlying analytical method and serves as a prerequisite for advanced courses in statistics. Presented from the point of view of the businessman, it is concerned with the nature and calculation of averages; measures of dispersion; measures of skewness, kurtosis, and normal curve analysis; an introduction to basic probability and its relation to sampling. Tabular and graphic presentation of data will be considered. A part of each session will be devoted to laboratory practice in the solution of problems.

(Prerequisites, Ec 1-2; M 3)

2 semester hours credit

†Ec 21 *Statistics II* — The course is concerned with the testing of simple hypotheses, use of confidence intervals, and the application to business problems of sampling distributions, particularly the normal, binomial, Poisson, t, and chi-square distributions. Problems drawn from actual situations also

illustrate the application of the analysis of variance and correlation techniques.

(Prerequisite, Ec 20)

2 semester hours credit

†Ec 23 *Statistical Methods in Forecasting* — This course introduces the student to the application of time series analysis. Among the principal topics considered are the measurements of secular trends by free-hand and mathematical methods; the measurement of seasonal fluctuations; cyclical fluctuations; the general nature and calculation of index numbers; and a discussion of regression and correlation.

(Prerequisite, Ec 21)

2 semester hours credit

†Ec 30 *International Economics* — This course attempts to analyze foreign trade and finance in terms of current practices and theories. It discusses national welfare and foreign trade; international accounting and what the balance reveals; the making of international payments and documents used; the rate of exchange; international equilibrium; foreign trade and the national income; principles behind protection; trade control through the tariff, import quotas, exchange control and their evaluation; international commodity agreements and commercial treaties; monetary policy problems; the international gold standard; exchange reserve standards; exchange stabilization fund; the shortage of dollars; the International Monetary Fund; international investments.

(Prerequisite, Ec 1-2)

2½ semester hours credit

†Ec 31 *Managerial Economics* — The purpose of this course is to show how economic analysis can be used in formulating business policies. It is an attempt to bridge the gap between the logic of economic theory and the problems of policy for practical management. The course stems from the conviction that the economic theory of the firm should be the core of work in business administration and that the procedures and methods of such specialized areas as marketing, production, and accounting should be related to the broad profit-making objective of business enterprise. In developing an economic approach to executive decisions, the course draws upon economic analysis for the concepts of demand, cost, profit, competition, etc., that are appropriate for the decision. Modern methods of econometrics and market research are employed to the extent and to the degree that they are necessary for getting estimates of the relevant concept.

(Prerequisites, Ec 1-2, 20-21)

2½ semester hours credit

†Ec 32 *Monetary Policy* — The Federal Reserve System is charged with regulating the amount of money in our economy. Their policies vitally affect the business community. An understanding of Federal Reserve and Treasury policies and action is essential to an understanding of our economic system. The primary purpose of the course is to integrate the student's knowledge about the causes of inflation and deflation. Discussion centers on the nature

of money and credit and their influence on interest rates, prices and the level of our economy. Monetary theories are studied to the extent time permits.

(Prerequisite, Ec 5-6)

2½ semester hours credit

†Ec 33 *Business Cycles and Forecasting* — The basis of this course is the determination and analysis of the forces which produce instability in our business economy. Various theories as to the causes of cycles and the history of past fluctuations are studied to develop the ability to better appraise current economic conditions. Considerable attention is given to important statistical measures and their use in forecasting cyclical changes. Representative stabilization programs and policies are discussed and evaluated.

(Prerequisite, Ec 20-21)

2½ semester hours credit

†Ec 34-35 *Business Planning and Research* — To assist businessmen to make more definite and more accurate business decisions through a broader understanding of the significant information and statistics regarding our economic system and its operations is the major objective of this course. Sources of information, strengths and weaknesses of principal measures of business activity, and the use of several widely accepted indexes in general business forecasting are the major part of the study, as well as sales forecasting, business cycle analysis, and the effects of the broadening relation of government policies upon the individual business firm.

(Prerequisites, Ec 5-6, 20-21)

5 semester hours credit

FOR OTHER COURSES IN THE ECONOMICS AREA THE UNIVERSITY COLLEGE BULLETIN SHOULD BE CONSULTED.

English (E)

E 1 *English* — Language as a means of communication. The study of language, meaning, and logic through analysis of the word, the sentence, the paragraph, and the whole composition. Written assignments to develop skill in exposition. Reading assignments to improve comprehension, analysis, and vocabulary.

2 semester hours credit

E 2 *English II* — Continuing the general purposes of E 1, this course proceeds to a study of the special problems of description and narration. Written assignments to develop skill in using language as a conveyor of thought.

(Prerequisite, E 1)

2 semester hours credit

E 3 *Introduction to Literature* — The purpose of this course is to acquaint the student with literature by examining some of the major types, *viz.*, the short story, the poem, and the play. The goals of the course are mastery of the major critical terms, the ability to use these terms effectively in discussing literature, introductory knowledge of some of the major critical theories, and the establishment of a frame of reference for analyzing works independently.

The concepts of Realism, Romanticism, and Classicism will be treated. The role of literature in our understanding of human and social relationships will be stressed.

2 semester hours credit

E 4 *Advanced Composition* — The technique of writing in the shorter literary form will be studied in detail. Practice in expository and imaginative writing leading systematically toward the building up of the student's individual style. A part of the time each week will be devoted to personal conference between the student and the instructor.

(Prerequisites, E 1, E 2)

2 semester hours credit

E 8 *The English Language* — This course is an introduction to the scientific study of the nature of the English language. The backgrounds and historical development of the language are studied through sounds, grammar, and usage. The problem of meaning and the symbolic nature of language are discussed.

(Prerequisites, E 2, E 3, or equivalent)

2 semester hours credit

E 9 *Introduction to Semantics* — A study of the ways in which language habits affect thinking processes and raise problems in social relationships. Meaning as communicated through language.

(Prerequisite, E 8)

2 semester hours credit

†E 10 *Effective Speaking* — This course offers practical training in the preparation and presentation of the various types of speeches. The instruction is planned to eliminate defects of voice, posture, and delivery, and to develop in the student an ability to speak easily, naturally, and forcefully. Continued practice in impromptu and extempore speaking, organization of material, consideration of the audience, and vocabulary building form the basis of the course.

2½ semester hours credit

†E 11 *Effective Speaking — Parliamentary Procedure* — This course is designed to train students in public speaking and parliamentary procedures. In content the course augments training in public speaking by adding those speech situations unique to active participation and leadership in organizations whose programs are educational, civic, social, fraternal, veteran, or labor, and whose functions as deliberative necessitate observance of basic parliamentary procedure in keeping with by-laws, constitutions, or charters. Roberts' Rules of Order, Revised, is the parliamentary text used.

2½ semester hours credit

E 15 *Introduction to Journalism* — This course treats the functions of the editorial department and the general tasks of an "inside" man. The student is given extensive practice in the rewriting of news stories.

(Prerequisites, E 1, E 2)

2 semester hours credit

E 16 *Introduction to Journalism* — The problems of reporting and newswriting, with written assignments in all types of spot news reporting.

(Prerequisite, E 15)

2 semester hours credit

E 17 *Techniques of Journalism* — Editing the news. The writing of editorials, feature articles, and columns.

(Prerequisites, E 15, E 16)

2 semester hours credit

E 18 *Techniques of Journalism* — A general practice course in newspaper writing, the covering of special assignments, and editorial problems.

(Prerequisite, E 17)

2 semester hours credit

E 21-22 *Western World Literature I* — This course is devoted to the study of books that have influenced mankind. Each assigned text is presented with sufficient reference to its national background to provide topical understanding but without prejudice to its primary significance as memorable literature, a product of the creative spirit of man. The student's attention is first drawn to great achievements in poetry and prose by writers in Greek, Latin, and Hebrew; he is then in a position to appreciate the uses made of a great literary inheritance by medieval and Renaissance authors.

4 semester hours credit

E 23-24 *Western World Literature II* — This course is devoted to the study of literature that has influenced mankind and is intended to provide an illuminating survey of comparatively modern writing. Beginning with the neoclassic writers of France and England, the student's attention is focused on such influential authors as Voltaire and Rousseau and then on celebrated poets and novelists of the nineteenth century.

4 semester hours credit

E 25 *English Literature to 1800* — A survey course of English literature. After a brief study of the social and political background of each literary period, the writing of the period is considered, and the more important writers are studied and read in detail. The purpose of the course is to give the student an appreciation of English literature as a whole, and an intimate knowledge of its major figures.

2 semester hours credit

E 26 *English Literature Since 1800* — A survey course of English literature. The outstanding writers are read, studied, and related to the general background of nineteenth century England. The purpose of the course is to give the student an understanding of the writers who contributed most to the formation and development of modern literature in England.

2 semester hours credit

E 27 *American Literature to 1860* — A survey of American literature from colonial times to the triumph of the transcendental movement in New England. The work of Bryant, Irving, Cooper, Poe, Emerson, Thoreau, Lowell, Holmes, Longfellow, and Melville will be emphasized.

2 semester hours credit

E 28 *American Literature Since 1860* — A survey of American literature from the Civil War, to include the rise of realism, the development of American humor, the appearance of local color writers, and modern trends since 1900.

2 semester hours credit

ALL STUDENTS ENROLLING IN COURSE E 30 OR ABOVE SHOULD HAVE COMPLETED E 3 AND ONE FULL YEAR SURVEY COURSE (TAKEN FROM THOSE LISTED AS E 21 TO E 29) OR SECURE THE APPROVAL OF THE DIRECTOR.

E 31-32 *Chaucer* — A study of Chaucer's poetry, with careful attention to Middle English vocabulary, historical setting, and general critical considerations. During the first semester emphasis will be placed on the *Canterbury Tales*. In the second semester other works will be studied, including *Troilus and Criseide*, *The Parliament of Fowls*, *The Legend of Good Women*, and short poems.

4 semester hours credit

E 33-34 *Shakespeare* — The status of the theatre in Elizabethan London will be studied in relation to the economic and political situation of the times. Shakespearean criticism from a scholarly viewpoint will be considered. The main emphasis will be on an intensive study of selected comedies, histories, and tragedies. The first semester will include *Comedy of Errors*, *Midsummer Night's Dream*, *Twelfth Night*, *Romeo and Juliet*, and *Henry IV part I*. The second semester will include *Hamlet*, *Othello*, *Macbeth*, *King Lear*, and *The Tempest*.

4 semester hours credit

E 35-36 *Restoration and 18th Century English Literature* — Principal authors from 1660 to 1780 will be studied in relation to the political, social, and religious thought of the period. Stress will be upon the works of Dryden, Pepys, Butler, Bunyan, Addison, Defoe, Swift, Pope, Burke, Johnson, Goldsmith, Boswell, Gibbon, and Tom Paine.

4 semester hours credit

E 37-38 *Romantic Poets of the 19th Century* — Against the background of Romanticism, students will study the poetry of Wordsworth, Coleridge, Shelley, Keats, and Byron. The Victorian works, especially of Tennyson and Browning, will be followed by the pre-Raphaelites Rossetti, Morris, and Swinburne.

4 semester hours credit

E 39-40 *The English Novel* — The English novel will be viewed as a political and social instrument, with emphasis on artistic and psychological aspects, and the permanent concern of the novel with human character. The first semester will include: Defoe, Richardson, Fielding, Smollet, Stern, Walpole, Radcliffe, Beckford, Austen, and Scott. The second semester will be concerned with: Dickens, Thackeray, the Brontës, Trollope, Eliot, Meredith, Hardy, Bennett, Moore and Kipling.

4 semester hours credit

E 41 *English Drama* — A critical and historical study of English dramatic literature and the British theatre, with special attention to the major developments that parallel British literature and culture. Planned to round out the student's knowledge of literature and civilization.

2 semester hours credit

E 50 *The American Short Story* — This course places stress upon the development of the American short story from the early nineteenth century to the present. Authors whose works are discussed include: Poe, Hawthorne, Harte, Freeman, Jewett, O. Henry, Steele, Lardner, Hemingway, Faulkner, and others.

2 semester hours credit

E 51 *The American Novel* — A survey of American fiction to the end of the nineteenth century. Special attention will be given to the novels of Brown, Cooper, Hawthorne, Melville, Twain, James, and Howells. Discussion includes readings, lectures, and reports. *2 semester hours credit*

E 52 *American Drama* — A critical and historical study of American dramatic literature and the American theatre, with special attention to the major developments that parallel American literature and culture. Planned to round out the student's knowledge of American literature and civilization. *2 semester hours credit*

E 53 *Contemporary American Poetry* — The purpose of this course is to acquaint the student with the poetry of his own time and to help him understand and enjoy poetry generally. It will deal with verse written by American poets, especially during the period of the last fifty years, concentrating on contemporary work. There will be some analysis of the technical aspect of the poems, and both form and content will be examined in relation to the revolutions of the age in which we and these poets live. *2 semester hours credit*

E 54 *Modern American Novel* — A study of some of the outstanding American novels of the twentieth century, with emphasis on the social outlook they imply. Norris, Dreiser, Lewis, Dos Passos, Hemingway, Steinbeck, and others. *2 semester hours credit*

Fine Arts (F)

F 1 *Introduction to the Arts* — This course is designed to introduce the student to the techniques and meanings of various artistic expressions. The stylistic, esthetic and social factors of painting, sculpture, drawing, architecture and graphic art are studied in detail. This course also includes a general introduction to the characteristics of music. However, the major stress of the course is on the visual arts. *2 semester hours credit*

F 2 *History of Ancient Art* — A study of the materials and techniques of ancient artisans in architecture, sculpture, and painting. This semester of the course includes a survey of prehistoric art, and the arts of ancient Egypt, Mesopotamia, Crete and Greece. Lectures are illustrated with slide projections and include brief historical accounts of each period under discussion. *2 semester hours credit*

F 3 *History of Medieval Art* — Beginning with a study of ancient Rome and its people, this semester of the course includes a study of Roman art and architecture, Early Christian art, Christian symbolism, Byzantine art, Romanesque, and Gothic. Lectures include brief historical accounts of each period under discussion and slide projections. *2 semester hours credit*

F 4 *Art Appreciation* — This course presents an examination of the characteristics of painting, sculpture and graphic arts to help the layman or beginning student to develop visual experience with these art forms. Slide pro-

jection lectures and visits to the Museum of Fine Arts are included in the course. The works of many great artists in the history of art are studied such as Rembrandt, Da Vinci, Michelangelo, and Picasso.

2 semester hours credit

F 5 Italian Renaissance Art — Beginning with a study of Early Renaissance architecture and sculpture, this course then concentrates on Early Renaissance painting. The course traces the development of Italian art from the time of Brunelleschi, Ghiberti, and Giotto to the age of Leonardo Da Vinci. The study of the High Renaissance includes painting, architecture and sculpture. The works of Michelangelo, Raphael and the Venetian school are studied in detail.

(Prerequisite, F 1 or F 4)

2 semester hours credit

F 6 European Art — The course traces the stylistic, social, technical and historical development of painting, sculpture, and architecture from the late sixteenth century up to the end of the nineteenth century Romantic period in northern and western Europe. The artistic expressions of El Greco, Brueghel, La Tour, Rubens, Frans Hals, Rembrandt, Velasquez, Poussin, Watteau, David and others are studied in detail.

(Prerequisite, F 1 or F 4)

2 semester hours credit

F 7 History of American Art I — A study of the development of American art from colonial times to about 1860. The object of this course is to acquaint the student with the rise of architecture, sculpture, and painting in America. Lectures include discussion of techniques, styles, methods, and materials employed during the periods considered. Slide projection lectures and visits to the Museum of Fine Arts are included.

F 8 History of American Art II — This course begins with the Civil War Period and includes a study of American architecture, sculpture, and painting up to the present. Particular attention is given to the work of Henry Hobson Richardson, Louis Henry Sullivan, and Frank Lloyd Wright. Lectures are illustrated with slide projections, and a visit to the Museum of Fine Arts is included in the course.

2 semester hours credit

F 9 Modern Painting — A survey of the development of painting from nineteenth century romanticism to the present day. The course includes a detailed examination of the social, technical, and philosophical factors involved in the various schools of painting in contemporary American and European art. Emphasis is placed upon the works of French impressionists, post impressionists, German expressionists, realists, surrealists, and contemporary abstraction. The works of Van Gogh, Gauguin, Seurat, Picasso, Braque, Miro, Kirchner, Munch, Klee and Kandinsky are studied in detail. The course includes museum and art gallery visits and lectures.

(Prerequisite, F 1 or F 4)

2 semester hours credit

Mu 1 Introduction to Music — The principal concern of this course is to teach the student a technique for listening actively and perceptively to music. It is designed for non-musicians. It surveys and analyzes representative serious works from a basic standard repertoire.

2 semester hours credit

Government (G)

G 1-2 *American Government* — The study of our National Government with respect to its organization and function; its powers and limitations under the Constitution; its legislative, administrative, and judicial machinery under the party system of government and bureaucracy. It continues with a more detailed study of the relationships of our federal, state, and municipal governments, including an analysis and comparison of the various state governments and types of municipal government with respect to state and local agencies for carrying out the executive, legislative, and judicial functions of government in a democratic country. *4 semester hours credit*

G 3 *Comparative Government* — This course examines the political structure of major contemporary democratic states. It concerns the nature and mechanics of political democracy in England and the Commonwealth Nations, France, and other continental democracies. The course surveys the constitutional development, parties, and elections, legislative and executive responsibility, cabinet governments, public administration, legal system, local government, and current political problems and policies in the above named states. *(Prerequisite, G 1-2) 2 semester hours credit*

G 4 *Comparative Government* — This course examines the political structure of existing totalitarian states with special emphasis on the several aspects of Marxist concepts of government as exemplified in Russia, China, and with reference to Fascist concepts of government practiced prior to World War II in Germany and Italy. Reference is made frequently to older forms of autocratic government. *(Prerequisite, G 3) 2 semester hours credit*

G 10 *Plato's Republic* — An examination of a fundamental book on politics. The study will seek to make clear the underlying rationale of Plato's political thought. Its possible application to present-day social understanding will be explored. *(Prerequisite, G 1-2) 2 semester hours credit*

G 11-12 *International Relations and Politics* — A study of politics among nations. Nature of the nation state. Instruments of state policy. Objectives of state policy. Rise of diplomacy. Peace through alliance. Collective security. Existing international limits on state policy. Recent policies of major powers. *(Prerequisite, G 1-2, or equivalent) 4 semester hours credit*

G 13 *Current Political Issues* — This course will deal with the major political issues before the American people today with the suggestions made by various groups to meet these issues. An attempt will be made to present all points of view, and to show the student how to recognize them in local and national newspapers and magazines. Part of each week will be spent in an analysis of current issues as seen in Republican and Democratic news organs from several different viewpoints, and assignments will be made from these publications as well as from textbooks. Controversy and debate will be encouraged. *2 semester hours credit*

G 14 *American Politics and Political Parties*— This course deals with democracy at work under the American system of political parties. It is introduced by a consideration of the various groups such as sectional, business, labor, farmer, racial, religious, veteran, etc., which contend for power through our democratic processes; the techniques used by these pressure groups such as lobbies, propaganda, education, financial pressure, etc. The two-party system, with the history, platform, and policy of each, is analyzed and discussed. The reasons and relative successes of Third Party attempts from the early Populists to the Progressives are considered with the national minority parties and the state party groupings. The course is concluded by giving attention to state and local politics and the electorate in an attempt to determine why people vote as they do.

(Prerequisite, G 1-2)

2 semester hours credit

G 15 *American Foreign Policy*— This course concentrates on the role of the United States in world politics, principally since the end of World War II. The history of American foreign policy since 1775 serves as a background for understanding present policy. An analysis of the governmental mechanism for the conduct of United States foreign affairs, fundamental factors affecting American foreign policy and the major problems confronting the United States receive stress.

(Prerequisite, G 1-2)

2 semester hours credit

G 17-18 *Soviet Foreign Policy*— This course deals primarily with Soviet foreign policy and World Communism. It will deal exhaustively with the so-called "seven periods" of Soviet Foreign policy: the Comintern period, the period of retrenchment and resurgence in the twenties, the growth of Fascism and the resulting Popular Front, the Nazi-Soviet Alliance, the War Front of 1941-1945, and the postwar period. Much attention will be paid to the workings of Communist parties in Europe and Asia, as well as in the United States; to the phenomenon of Titoism; and finally to a discussion of the cold war, Korea, China, and possible alternatives of American foreign policy today.

4 semester hours credit

G 19 *Modern Political Theory*— A critical study of the major systems of political philosophy since Bentham. An ever-present consideration will be the impact of these systems of thought on present-day social science.

(Prerequisite, G 3-4 or equivalent)

2 semester hours credit

G 21 *America As a Civilization*— An examination of the major traditions of American social thought. The impact of tradition upon practice for major American social groups. American education as citizenship training. The implication of these considerations for American domestic and foreign policy.

(Prerequisite, G 1-2)

2 semester hours credit

G 23 *Government and Politics of Underdeveloped Nations*— This course examines the political structure and dynamics of certain key nations that are attempting to maintain political independence and stability in the face of economic want. Nations for study will be selected from the Near East, Africa, South America, and Southeast Asia.

(Prerequisite, G 1-2)

2 semester hours credit

G 24 *Modern Ideologies* — An examination of the major ideologies existing in today's world: communism, fascism, capitalism and socialism. Writings by defenders of each ideology will be read. A paper will be required from the student.

(Prerequisite, G 1-2)

2 semester hours credit

G 25 *Politics and Administration* — Decision making in administration. Executive control over administration. Congressional interest in administration. The impact of parties and pressure groups on administration. Administration and public relations. Technical competence and the administrative generalist.

(Prerequisite, G 1-2)

2 semester hours credit

G 26 *Mass Media and Democratic Politics* — The mass media identified. Mass media and representative democracy. Underlying beliefs and unpopular opinions. The problem of bias and of varied points of view. The problem of significant coverage of events. The meaning of press freedom for the mass media. The mass media and internal censorship. Implications for citizen education. The possibility of a more responsible mass communications media.

(Prerequisite, G 1-2)

2 semester hours credit

G 27 *Contemporary World Problems* — A study of major problems of international significance in the 20th Century, with special emphasis on historical development of the following: anti-colonialism and political instability; international economic relations; the role of the United Nations; the Cold War; problems of military preparedness; collective security on trial; and changing patterns of diplomacy.

(Prerequisite, G 1-2)

2 semester hours credit

G 28 *City Life and Politics* — The impact of urbanization on political personality. The political implications of transiency, of depersonalization and the breakdown of friendship groups, of mass communications as an educator of citizens. The nature of citizenship in our metropolitan centers. The meaning of bossism and recent developments in metropolitan political leadership. Metropolitan reconstruction for personal happiness.

(Prerequisite, G 1-2)

2 semester hours credit

†Ec 12 *Government Controls in Business* — A study of the economic and political relationships which exist between business and government with particular reference to the Sherman Act and Anti-Trust Laws; Securities and Exchange Commission; Interstate Commerce Commission; regulation of public utilities; the Co-operative Movement; the Social Security Act; government and labor; business regulation by taxation.

(Prerequisite, Ec 1-2)

2½ semester hours credit

History (H)

H 1-2 *History of Civilization* — This is primarily a course in Ancient Classical Civilization. Introductory lectures deal with the beginnings of civilization and the contributions of Egypt, Babylonia, and Syria. More detailed work is done in Greek and Roman history, the rise of Christianity, the barbarian invasions of the Roman Empire, and the origins and growth of Islam.

4 semester hours credit

H 3-4 *History of Civilization* — This course deals with the history of the Middle Ages, the growth of the monarchies in Europe, the development of constitutional government, the Renaissance, the doctrines and politics of the Protestant Reformation, the economic and the industrial revolution, the growth of science and industrialism, and the origins of the World War.

As in H 1, equal weight is given to political, cultural, and economic history.

4 semester hours credit

H 9 *The United States to 1865* — This course is an interpretation of the events which shaped the American nation to the Civil War. The course stresses political history and makes use of social, intellectual, and economic influences in interpreting political events.

2 semester hours credit

H 10 *The United States Since 1865* — The problems of Reconstruction, third party protests, the money question, Progressivism and New Dealism, as well as the emergence of the United States as the dominant world power after two world wars.

2 semester hours credit

H 11 *Recent American History* — The contending political, economic and social forces in American domestic history of the Twentieth Century and America's rise to world leadership. This takes the student from McKinley laissez-faire through the Fair Deal to the Kennedy administration, and from the emergence of the United States as a world power in the early part of the century to its present position of dominance.

2 semester hours credit

H 13 *English Constitutional History* — A study of the origin and development of the English Constitution up to 1485. Special emphasis is placed on those institutions and concepts that form the background for American constitutional history. The important differences between the American and English constitutions are stressed. This course is important for those who intend to study law.

2 semester hours credit

H 14 *American Constitutional History* — An introductory course to the history and principles of American constitutional law. It is designed to give the student an understanding of case-law and the significance of the courts in the American system of government. Among the special topics covered are the power of the Supreme Court to pass upon statutes, the relation of national and state powers, civil rights, and the Commerce clause. Highly recommended for students planning to study law.

2 semester hours credit

H 16 *Social and Cultural History of the U. S.* — A study of the development of a distinct American civilization beginning about two generations after the Revolutionary War. The institutions, social customs, and culture of the Colonies as influenced by England. The influence of the Southern aristocracy on the early cultural patterns, and the emergence in the late Nineteenth Century of the impact of the industrial North; Twentieth Century Liberalism as an outgrowth of the Populist Movement, Rooseveltianism, Progressivism, the New Deal, and the growth of welfare projects; a study of the influence of the Social Security Act and contemporary American society.

2 semester hours credit

H 17 *Economic History of the U. S.* — The desire for freedom of manufacture as one cause of the Revolutionary War. The effect of the Embargo Act on trade in the early Nineteenth Century, the effect of agricultural feudalism in the South, the national growth of industry in the latter part of the Nineteenth Century. United States' pre-eminence in world trade and banking in the Twentieth Century, United States' position today and current economic trends.

2 semester hours credit

H 19-20 *English History* — The development of three trends of importance in ancient and medieval England, namely, relationships between church and state, development of nationalism from feudalism, and the origin and development of the English constitution. It further studies in modern England the rise of cabinet parliamentary government, the Newtonian and Darwinian intellectual revolutions, the agricultural and industrial revolutions which set the stage for England's *Age of Reform*; all of which formed the background for the emergence of England as a socialist democracy.

4 semester hours credit

H 21 *Modern European History 1815-1914* — This course deals with Europe during a century of comparative peace but tremendous social change. After examination of the period of reaction following the Congress of Vienna, attention shifts to those forces transforming European society—especially the Industrial Revolution and Nationalism. The course places special emphasis upon such intellectual movements as Liberalism and Socialism and concerns itself with the various social, economic, and political factors which led to World War I.

2 semester hours credit

H 22 *Recent European History* — The contemporary era of conflict since 1914 is treated in this course. A discussion of Darwinian concepts which influence the Twentieth Century is followed by a detailed study of the varied applications of these ideas in the major European states. The course deals briefly with military aspects of both world wars and with postwar attempts to secure lasting peace. The Soviet Russian regime and basic Communist beliefs are examined in detail to provide an understanding of contemporary world developments.

2 semester hours credit

H 23-24 *Russia since 1917* — This course will concentrate on the rise of Marxist and Communist ideas in Europe, the nature of Marxist theory, the

development of the Bolshevik Party and Leninism in Russia, the Russian Revolution, the Civil War, the New Economic Policy, and the development of social, economic, and political institutions in the Soviet Union to the present day. *4 semester hours credit*

H 27 *Modern India* — This course concerns twentieth century India, its problems and basic civilization. The social and religious aspects of Hinduism, Muslim communalism, economic and population problems, and aspects of British imperialism form the background for the study of Gandhi's non-violent war of independence. India's present position as a factor in the world wide balance of power is examined. *2 semester hours credit*

H 28 *Modern China and Japan* — This course concerns twentieth century China and Japan, their problems, and basic civilizations. Basic Chinese philosophy, the rise and influence of Confucianism, Buddhism and its influence, Chinese and Japanese social and economic development precede a detailed study of the Chinese struggle against foreign imperialism which is depicted against the backdrop of the Japanese-American quarrel over the Open Door. The Communist victory in China is examined and the current United States position in the Far East is also considered. *2 semester hours credit*

H 29 *Contemporary Latin-America* — During the period since World War I there has developed an increasing interdependency between the nations comprising North and South America. Much attention has been given to the strengthening of the bond of inter-American friendship which has resulted in increased commerce and a closer unity of action in world politics.

This course is primarily related to the social, political, and economic developments of the countries of Latin America, their national character, and relation to world affairs, all studied through their cultural heritage and their emerging political patterns. *2 semester hours credit*

H 31 *Contemporary Africa* — Africa is in a threshold period of its history. It is emerging from centuries of colonial subjugation into a position of positiveness in world affairs. This course will provide a basis for assessing the role Africa will play and the importance of that continent to the United States. It will concentrate on the principal characteristics and problems of modern Africa, including a survey of basic geographic, political, economic, and cultural features, including discussion of such problems as Nationalism, intergroup tensions, economic development, and urbanization. *2 semester hours credit*

H 32 *Contemporary Middle East* — In recent years the Middle East has been the center of an internal turmoil which has come to play an increasingly significant role in the conflict between East and West. The geographic and historic backgrounds, the Zionist and Arab Nationalist Movements, and the foreign policies of Britain and France in the area form the backdrop for a study of the social, political, and economic problems of the following nations: Turkey, United Arab Republic, Israel, Lebanon, Jordan, Iraq, Iran, Yemen, Saudi Arabia, Aden, Afghanistan, Pakistan. *2 semester hours credit*

H 35-36 *History of Russia to 1917* — This course covers the period from the ninth century to the November Revolution of 1917. Particular emphasis is placed on social, political, and economic aspects.

The strengths of the Tsarist system are revealed, together with the evils and weaknesses primarily responsible for the rise of the Communist State.

The first semester covers the development of the Russian State from the Pre-Kievan period through the reign of Catherine the Great.

The second semester continues from the reign of Catherine emphasizing problems and developments leading up to the Bolshevik Revolution.

4 semester hours credit

Mathematics (M)

701 *Algebra* — Proceeding from a rapid review of the fundamental operations of Algebra, the work continues with a thorough study of fractions, functions, linear and quadratic equations, equations in quadratic form, graphs, exponents, complex numbers, binomial expansion, variation, and equations of higher degree than the second.

3 semester hours credit

702 *Trigonometry* — This course includes the solution of all triangles by both natural and logarithmic functions, identities, radian measure, principal values and the solution of trigonometric equations. Particular attention is given to the applications of Trigonometry to engineering practice.

(Prerequisite, 701)

3 semester hours credit

703 *Analytic Geometry and Differential Calculus* — This course provides a smooth transition from algebra and trigonometry into the Calculus. Included are the studies of the straight line, the circle, and conic sections, using rectangular coordinates only. The graphs of trigonometric, logarithmic, and exponential functions are also covered. Then follows the differentiation of algebraic and transcendental functions, both explicit and implicit, with some applications. Slopes of curves, maxima and minima, derivatives of higher order, velocity and acceleration in rectilinear motion are included.

(Prerequisite, 702)

3 semester hours credit

704 *Integral Calculus* — This course deals with integration as the inverse of differentiation as well as the limit of summation. The topics covered are methods of integration; use of integral tables; definite integrals; areas in rectangular coordinates; length of curves; areas of surfaces of revolution; volumes of solids of revolution; multiple definite (iterated) integrals; centroids of plane areas; moment of inertia.

(Prerequisite, 703)

3 semester hours credit

M 2-3 *Mathematics* — Basic mathematical principles and techniques are discussed, with application drawn from business and industry, as well as from engineering and the sciences. The main concern is to establish an under-

standing of the fundamental mathematical processes and to acquire facility with modern computational techniques and aids. Practical work includes problems in graphic presentation, simple analytic geometry, solution of triangles, manipulation of exponents and logarithms as well as a survey of selected topics in the field of topology and symbolic logic. Entrance into this course is predicated on successful completion of the Preparatory Mathematics diagnostic examination which will be administered the first meeting of this class.

4 semester hours credit

M 10 *Probability and Statistics* — An introduction to that portion of probability theory and statistics which may be treated without calculus. Among the topics included will be the mean and variance for finite sample spaces, the binomial distribution, and an introduction to the theory of sets and of permutations and combinations.

3 semester hours credit

Modern Languages (ML)

ML 1-2 *Elementary French* — An introductory course stressing the essentials of grammar, practice in punctuation, and progressive acquisition of a basic vocabulary with idiomatic expressions. Written and oral exercises are based upon simple French prose. The course develops into the reading of more difficult work accompanied by practice in conversation.

4 semester hours credit

ML 3-4 *Intermediate French* — A review of grammar. Reading of French prose of moderate difficulty. Emphasis is placed upon the acquisition of reading and conversational ability through the use of written and oral exercises.

(Prerequisites, ML 1-2 or equivalent)

4 semester hours credit

ML 10-11 *Elementary Spanish* — An introductory course stressing the essentials of grammar, practice in pronunciation and progressive acquisition of basic vocabulary and idiomatic expressions. Written and oral exercises are based upon simple Spanish prose. The course develops into the reading of more difficult work accompanied by practice in conversation.

4 semester hours credit

ML 12-13 *Intermediate Spanish* — A review of grammar. Reading of Spanish prose of moderate difficulty with practice in conversation. Emphasis is placed upon the acquisition of reading and conversational ability through the use of oral and written exercises.

(Prerequisites, ML 10-11 or equivalent)

4 semester hours credit

ML 20-21 *Elementary German* — An introductory course stressing the essentials of grammar, practice in pronunciation, and the acquisition of a basic vocabulary, and the study of idiomatic expressions, use of subjunctive mood. The course develops into the reading of more difficult work accompanied by practice in conversation.

4 semester hours credit

ML 22-23 *Intermediate German* — Reading of German prose of moderate difficulty, with practice in conversation. Introduction to the history of German civilization through texts of average difficulty, review of grammar, oral and written exercises.

(Prerequisites, ML 20-21 or equivalent)

4 semester hours credit

ML 30-31 *Elementary Russian* — An introductory course starting with the Russian alphabet; stress is placed on grammar, practice in pronunciation, acquisition of a basic vocabulary and idiomatic expressions. Written and oral exercises are based upon simple Russian prose accompanied by practice in conversation.

4 semester hours credit

ML 32-33 *Intermediate Russian* — Reading of Russian prose of moderate difficulty, including some attention to scientific writings, with practice in conversation. Emphasis is placed upon the acquisition of reading and conversational ability through the use of oral and written exercises.

(Prerequisites, ML 30-31 or equivalent)

4 semester hours credit

Music (Mu)

Mu 1 *Introduction to Music* — The principal concern of this course is to teach the student a technique for listening actively and perceptively to music. It is designed for non-musicians. It surveys and analyzes representative serious works from a basic standard repertoire.

2 semester hours credit

Philosophy (Ph)

Ph 1-2 *Introduction to Philosophy* — The first semester covers the aims, nature, problems of philosophy and its methods of inquiry and explanation; examines and compares the relationships between common sense, the concepts of the human and natural sciences, the philosophical thought; theories about life, mind, and the physical world; teleology, vitalism, and mechanism; psychological and philosophical views about the nature of and relationship between mind and body; determinism, freedom, fatalism, and chance; and the sources, standards and validity of knowledge. The second semester consists of a critical analysis of the fundamental assumptions, teachings, and the theoretical and practical implications of the major schools of philosophy, namely, naturalism, idealism, pragmatism, realism, positivism, and existentialism. It will also cover generic, moral, religious, cognitive, esthetic, and social values; meaning and direction in Nature and history; society and the state; and conclude with the function and benefits of philosophical thinking for the examined life.

4 semester hours credit

Ph 3 *History of Ancient Philosophy* — A survey of the rise and development of Western scientific and philosophical thought and its influences from classical Greek beginnings to medieval times, with special emphasis on such great trends, schools, and thinkers as the Sophists, the Eleatics, Atomists, Plato, Aristotle, the Epicureans, the Stoics, the later Skeptics, Neo-Platonists, and early Christian philosophers.

2 semester hours credit

Ph 4 *History of Modern Philosophy* — A study of the great philosophical minds and their intellectual climates since the Renaissance. Comparison of ancient, medieval, and modern scientific and philosophical objectives, methods, and outlooks on man, culture, and nature. Particular attention to the writings of Bacon, Descartes, Hobbes, Spinoza, Locke, Berkeley, Hume, Kant, Hegel, and others, as well as to their influence on the contemporary Western milieu and treatment of recurrent philosophical problems confronting man through the ages.

2 semester hours credit

Ph 5 *Philosophy of Art, Aesthetics* — An examination of the nature, status, and function of art and beauty in their various forms in life. The relationship between the artistic-aesthetic and other human values and activities. Contrast between the practical, intellectual, and aesthetic impulse and attitude. Classical theories concerning art and the aesthetic experience. The problem of taste, standards of criticism, and objectivity of the aesthetic judgment. The arts, the artist, and society.

2 semester hours credit

Ph 6 *Philosophy of Religion* — A philosophical evaluation of religious experience, problems, beliefs, values and of their relationship to man's experience in its totality and to his needs, aspirations, and destiny. Discussion of modern conceptions about the Deity, good and evil, meaning and purpose in life and the physical world, human personality and freedom, immortality of the soul, and prayer and worship. The bearing of views and problems in modern science, philosophy of nature, theory of knowledge, ethics, aesthetics and general theory of value on relevant phases of religious experience and belief.

2 semester hours credit

Ph 7 *Principles of Social Ethics* — This course treats, concretely and analytically, such moral problems as human motives and conduct, egoism and altruism, implications of modern psychological and sociological theories about man and society, the meaning of good and evil, right and wrong, the role of customs and tradition, conscience, obligation, law, responsibility, freedom, and determinism. It evaluates critically the teachings of the major ethical schools, presents classical formulations of the good life, and explains the nature of the moral judgment and the ethical standard, and their relationship to economic, political, legal, religious, and other influences, values, and institutions.

(Prerequisite, Ph 1-2)

2 semester hours credit

Ph 8 *Problems in Social Ethics* — A continuation of Ph 7, including an analytical, critical review of ethical data and theories in an attempt to analyze concrete moral situations involving the individual, the family, business and industry, the professions, government and politics, labor unions, education, etc. The underlying twofold aim of the course is to acquaint the student with the essential principles of reflective moral thinking and their applications to his own personal life and in his role as a citizen.

(Prerequisite, Ph 7)

2 semester hours credit

Ph 9 *Logic I* — An introductory course in the art of correct thinking and effective discourse, conducted with a view to enabling the student to analyze effectively types of argument or discourse and to detect fallacies resulting from semantic confusion and methodological error. The course includes exercises in the structure and logical relations of propositions, types of deductive reasoning and other thought processes used to obtain clear verbalization.

(Prerequisite, Ph 1-2)

2 semester hours credit

Ph 10 *Logic II* — Continuation of Logic I, treats the limitations of deductive reasoning; nature of truth, proof, and their relationship to validity; inductive versus deductive procedures; the rationale of beliefs, common sense, and common practices; the scientific spirit and attitude; inductive procedures and proof, argument or verification in the physical and social sciences; judgments of fact and judgments of value; the testing of evaluative judgments; the functions and relationships of deduction and induction, formal and factual reasoning.

(Prerequisite, Ph 9)

2 semester hours credit

Ph 11-12 *Social and Political Philosophy* — A survey and critical evaluation of the major psychological, social, political, and ethical theories on the nature of man, society, institutions, values, with the main emphasis on thinkers and movements in the modern era, beginning with the seventeenth century. Readings chosen from the works of Hobbes, Locke, Hume, Rousseau, Hegel, J. S. Mill, T. H. Green, Bosanquet, Marx, Lenin, Spengler, Schweitzer, Toynbee, Whitehead, Northrop, and others.

(Prerequisite, Ph 1-2 or S 1-2)

4 semester hours credit

Ph 13-14 *Contemporary Philosophical Tendencies* — Selected problems and readings in 20th century philosophers representative of idealism, realism, naturalism, instrumentalism, logical positivism and existentialism, such as Russell, Dewey, Perry, Lewis, Bridgman, Carnap, Urban, Ayer, Moore, Ross, Alexander, Sartre, Schlick, Stace, Ducasse, Maritain, and others.

(Prerequisite, Ph 1-2)

4 semester hours credit

Ph 15-16 *Philosophical Ideas in America* — A historical-systematic survey from Jonathan Edwards to the present, and analyses of readings from Edwards, Woolman, Jefferson, Paine, Emerson, Pierce, Royce, James, Santayana, Dewey, and others, with particular consideration of their reflection of or influences upon the American cultural milieu.

(Prerequisite, Ph 1-2, or S 1-2)

4 semester hours credit

Ph 17-18 *Current Theories of Mind, Body, and Personality* — A critical survey of the nature, structure, function, and relationship of the human body, mind, and selfhood in the light of recent psychological theories — dynamic, depth, hormic, holistic, behavioristic, gestalt, psychoanalytic and philosophical interpretations, as well as their theoretical and practical implications.

(Prerequisites, Ph 1-2, Ps 1-2 or equivalent)

4 semester hours credit

Psychology (Ps)

Ps 1-2 General Psychology — This course presents an introductory survey of the general field of psychology. Emphasis is placed upon the experimental approach to the study of behavioral data including growth and development, learning, perception and motivation. It considers the sensory basis of response, individual and group differences, mental testing, attitude formation, personal adjustment, and historical backgrounds of psychology.

4 semester hours credit

Ps 3 Psychology of Personality — A systematic study of personality growth. Approaches to the understanding of personality are made through a review of the physical, mental, and emotional development of the individual and of the social influences upon him. Several of the more prominent theories in the field are considered and case material is presented. Some concentration is placed on minor personality maladjustments.

(Prerequisite, Ps 1-2 or equivalent)

2 semester hours credit

Ps 5 Abnormal Psychology — The study of abnormal behavioral characteristics. Attention is directed to the historical development of the field with emphasis upon the theories of abnormal behavior, their etiology, symptoms and treatment.

(Prerequisite, Ps 1-2 or equivalent)

2 semester hours credit

Ps 7 Child Psychology — An introduction to the growth and development of infants and young children. Systematic study is made of their characteristic patterns of behavior, motivations, needs, and cultural influences.

(Prerequisite, Ps 1-2)

2 semester hours credit

Ps 8 Adolescent Psychology — A systematic exploration of developing growth patterns of later childhood and pre-adolescent behavior and their implications for adult life. Parental functions, problems pertaining to adolescence and their relationship to society and cultural influences are discussed.

(Prerequisite, Ps 7)

2 semester hours credit

Ps 9 Social Psychology — A study of the psychological principles underlying human relations with emphasis upon the social influences that guide our everyday behavior. The relation of man to the group. Motivation, attitudes, personality in social behavior.

(Prerequisite, Ps 1-2)

2 semester hours credit

Ps 11 Developmental Psychology — The nature of growth during the first six years of life is considered in terms of its relationship to personality development. Attention is focused on the possible connections between early activities and subsequent emotional characteristics. The interaction of child and parent, sibling rivalry, and the character of intellectual, sexual, and social development are explored.

(Prerequisite, Ps 1-2)

2 semester hours credit

Ph 17-18 *Current Theories of Mind, Body, and Personality* — A critical survey of the nature, structure, function, and relationship of the human body, mind, and selfhood in the light of recent psychological theories — dynamic, depth, hormic, holistic, behavioristic, gestalt, psychoanalytic and philosophical interpretations, as well as their theoretical and practical implications.

(Prerequisites, Ps 1-2, Ph 1-2 or equivalent) 4 semester hours credit

†IR 2-3 *Human Relations* — Effective handling of human problems has become a factor of vital importance to management. This course in human relations in business is the foundation to all personnel policy and offers an approach or understanding of value not only to those in personnel work but also to all persons having supervisory relationships. Subjects included for discussion are the techniques of approach to situation analysis; problems in selection; training; employee rating; change of employee status; supervision; wage policies; complaints and grievances; employee morale; labor turnover; discipline; health; safety; employee participation; collective bargaining; public relations.

5 semester hours credit

Sociology (S)

S 1-2 *Principles of Sociology* — A perspective of Sociology covering facts and principles basic to a general knowledge of the field of sociology are presented. The origins, forms and forces of human associations are discussed, including a systematic treatment of group life, social institutions, social processes, social change, and social control. The course is designed to meet the needs of the student who desires only an elementary survey of the subject, as well as the student who plans to take advanced courses in social science.

4 semester hours credit

S 3 *Social Problems* — Attention is given to the nature, complex causation, and interrelatedness of social problems in general. Cultural change, with its attendant lags, as well as other social forces and conflicts are studied. While sociological theory is occasionally introduced to clarify the problem at hand, the course is essentially practical in character. Emphasis is given those pathological conditions which exist in relations between the individual and the group. Typical subjects presented include mental defectiveness and disease, alcoholism and drug addiction, suicide, delinquency and crime, and pathologies of domestic relations.

(Prerequisite, S 1-2)

2 semester hours credit

S 4 *Social Disorganization* — An analysis of the varieties, genesis, and proposed solutions of major social problems, such as prostitution, crime, delinquency, alcoholism, divorce, desertion, mental deficiency, and group conflict. The theory of institutional conformity and non-conformity, retribution, and reform.

(Prerequisite, S 1-2)

2 semester hours credit

S 5-6 General Anthropology — An introductory course in anthropology. The first semester will cover the fields of anthropology. The evolution of homo sapiens. Race and racism. Linguistics and anthropology. The nature of culture. The evolution of culture. The culture areas of the world. The second semester will cover comparative and functional analysis of culture. Habitat, technology, economy. Primitive society; kinship and political organization. Primitive religion, art, music and literature. Childhood, education and life-cycle in primitive culture.

(Prerequisite, S 1-2)

4 semester hours credit

S 7 Cultural Anthropology — Historic development of the cultural concept. Survey of cultural origins and change through time and space as approached through archaeology and ethnology; uniformities, differences, transmission and diffusion of cultures. Consequences of cultural concept in modern thought: racism, cultural relativity, cultural cycles, culture and personality; the relation of anthropology to the other social sciences.

(Prerequisite, S 6)

2 semester hours credit

S 9-10 American Culture — An attempt to understand the ethos of the United States through study of its social institutions; familial, economic, political, educational and religious. Consideration is also given to social classes and stratification, to include subcultures and cultural integration; mobility; and the basic value system.

(Prerequisite, S 1-2)

4 semester hours credit

S 13-14 Juvenile Delinquency — The study of the extent, causation, and prevention of juvenile delinquency. A review of the development of the Juvenile Court and the Youth Authority programs as well as an analysis of probation, parole, and institutional treatment of juvenile delinquents. Evaluation of various prevention programs and the detailed study of a series of case histories.

(Prerequisite, S 1-2)

4 semester hours credit

S 15-16 Criminology — The nature and causes of crime, the criminal as a social problem, judicial agencies and procedures with past and present theories and penological practices. Procedures in adult courts, juvenile courts, and family courts. Prison systems as practiced both in Europe and the United States. Classification. Prison labor. Education within prisons. The theory of punishment as a deterrent. The individualization of treatment. Child guidance clinics. Youth service boards. The Borstal System. Social and cultural factors affecting crime. The place of psychiatry, social work, and religion in criminal treatment. The value and effectiveness of probation, parole, and indeterminate methods of treatment.

(Prerequisite, S 1-2)

4 semester hours credit

S 17 Social Service I — A survey of welfare agencies. Their origins, functions, and methods of operation. Problems of agencies involving health, child care, legislation, population distribution, etc. Emphasis is placed upon voluntary and state agencies and laws applicable to them.

(Prerequisite, S 1-2)

2 semester hours credit

S 18 *Social Service II* — Federal agencies and laws applying to their administration. The role of the Federal Government in national welfare and relief. Problems encountered, medical, economic, political, in agency management. Privileges and rights of a United States citizen under social service laws are reviewed.

(Prerequisite, S 17)

2 semester hours credit

S 21 *Preparation for Marriage* — A study of the basic factors of courtship, mate selection, engagement, marriage and rearing children in preparation for successful marriage and parenthood. Psychological, medical and theological prerequisites to marriage are discussed. Marital values and problems previewed, e.g., recreational, education, religious, child guidance, divorce, etc.

2 semester hours credit

S 22 *The Family — The Primary Social Institution* — The American Family — comparison and contrast with other Occidental and Oriental forms, both ancient and contemporary. Current changes in family life and causes. Genic and psychogenic conditioning, explaining the relationship between family members. Particular emphasis is given to the relation of the family to the social sciences and the promotion of education of young people for family life, marriage and parenthood. Of prime value to social service personnel and social science teachers.

2 semester hours credit

S 23 *Race Relations and Cultural Contact* — A critical study of racial traits and cultural associations in the United States and other regions. The differences between "race" and "culture"—race the biological concept, culture a universal maturing process. The problems of races and nationalities. Race conflicts and exploitation. An examination of the strong contemporary doctrines of racialism. A survey of the premises in which racial and cultural misunderstandings take root. An analysis of race differentials and culture differences. An attempt to reach scientific conclusions pertaining to the causes of biological variations and race attitudes.

(Prerequisite, S 1-2)

2 semester hours credit

S 24 *Urban Society* — A study of the modern American city based on its historical background and comparison with other cities of the world. Its types, social values and problem areas are discussed as are methods of city planning.

(Prerequisite, S 1-2)

2 semester hours credit

S 25 *Social Control* — Social Control is a study of the methods and basic principles which give wise direction to the growth and development of human relations. Covered are the nature and methods of Social Control, control in relation to social structure, leadership, and public opinion as factors in control, and contemporary problems of control.

(Prerequisite, S 1-2)

2 semester hours credit

S 26 *The Aging in American Society* — An analysis of the socio-cultural environment of the aged in American society. Problems of older workers in our culture, educational opportunities available, economic and financial status of

retired persons, and responsibilities of society for aiding in individual adjustment. An endeavor to understand older persons as physical, psychological and social entities.

2 semester hours credit

S 30-31 Social Theory — An historical development of social thought from ancient times to the more modern theories. The origins, aims, and accomplishments of the social science movement and sociology are studied. Contributions of men since the early nineteenth century are later examined, including Spencer, Marx, Sumner, Ward, Gumplowicz, Durkheim, Pareto and Thomas.

(Prerequisites, S 1, 2, 3, 4)

4 semester hours credit

Science (Sc)

Sc 1 Survey of the Physical Sciences — This course begins with a study of the Universe and the Solar System. Attention is then directed to the earth, first as an astronomical body and then from a geological and finally from a meteorological viewpoint. The course proceeds into the nature of matter and energy. The elements of physics and chemistry are studied and also their applications to everyday life. A study is made of the basic theory underlying atomic energy as well as the more recent developments in atomic research.

3 semester hours credit

Sc 2 Survey of the Biological Sciences — A brief review of the history of biology is followed by studying the following: the cell and the essential life processes; examples of the plant and animal kingdoms, with particular emphasis on those organisms which have a direct effect on man; the flowering plants; ecology and conservation; the various human systems, with emphasis on physiology rather than anatomy; contributions of medicine; genetics and evolution.

(Prerequisite, Sc 1)

3 semester hours credit

Sc 3 General Biology — This course in biology is concerned with the study of life and life processes primarily as they relate to man's physiology and his biological and physical surroundings. The following basic principles are explained and interpreted in terms of human functions: properties of protoplasm, the importance of photosynthesis, food manufacture and utilization of energy, formation and adaptation of living organisms to their environments.

3 semester hours credit

Sc 4 General Biology — A continuation of fundamental biological relationships of man by consideration of pathogenic agents; the nitrogen, carbon and water cycles in nature; principles of plant and animal distribution; the principles of change; man and the balance of nature and his over-all relationship to natural forces.

(Prerequisite, Sc 3)

3 semester hours credit

Sc 7 *Physics I* — This course covers the principles of mechanics. Some of the topics covered are force; energy; work; statics; elasticity; linear, rotational and harmonic motion; liquids and gases.

Each lecture includes a demonstration period and a problem period in which the student learns the practical application of the physical laws being studied.

2½ semester hours credit

Sc 8 *Physics II* — This course begins with the study of wave motion and sound, and is followed by heat, light, and electricity.

The section in heat includes thermometry, expansion, calorimetry, behavior of gases, vaporization and transfer of heat. Under the subject of light are reflection, refraction, dispersion, diffraction and interference, lenses and optical instruments. The study of electricity includes magnetism, electrostatics, resistance, capacitance, inductance, alternating currents, and series and parallel circuits.

The same lecture procedure is followed with respect to demonstrations and problems as is done in Sc 7.

(Prerequisite, Sc 7)

2½ semester hours credit

Sc 9-10 *General Chemistry* — This course will instruct in the fundamental ideas of matter and energy; properties of gases, liquids, and solids; molecular weights; theory of valence; classification of the elements; ionic reactions, chemistry of metals and non-metals; electrochemistry; the solution of all types of problems to illustrate practical applications; introduction to organic chemistry, including industrial applications to petroleum, rubber, synthetic resins, plastics; chemo-therapy; laboratory experiments demonstrating the principles discussed in class.

Prerequisites, 702, Sc 7-8)

5 semester hours credit

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A fee of ten dollars must accompany this application. Make checks, money orders, or drafts payable to Northeastern University. This fee is not refundable.

COLLEGE OF LIBERAL ARTS

Evening Courses

360 HUNTINGTON AVENUE, BOSTON 15, MASS.

APPLICATION FOR ADMISSION

To the Director:

Date.....19.....

Mr.
Mrs.

I (Print name in full) Miss (First) (Middle) (Last)

hereby apply for admission to the College of Liberal Arts, evening sessions.

I plan to take the program checked below and wish to enter with the term beginning19..... month

Bachelor of Arts Degree

- ☐ Economics
☐ English
☐ History-Government
☐ Sociology

Bachelor of Science Degree

- ☐ Management
Associate in Arts Degree
☐ Arts

To enable you to determine my eligibility for admission, I am furnishing the following information:

Home Address: Street City Residence Telephone

Employed by: Address City
Company

Date of birth Age years mos.

Name and address of parent or guardian if under 21 years of age

I have attended the following schools above the eighth grade. (Include other schools of the Northeastern University system, and if you have attended other universities designate the school.)

NAME OF SCHOOL	LOCATION — CITY, STATE	Check Years Attended				Year Left	Year of Graduation	Degree if any
		1	2	3	4			

Course taken in high school (college, general, etc.)

I request advanced standing credit and will furnish transcript for previous college work completed at

For information relative to my character and general ability, I refer you to the following person who is not a student or relative:

Name Street

City State Occupation

I first learned of Northeastern University through

Following is the name and address of the person who recommended that I enter the University

.....
Usual signature

Approved for admission as a special student.
regular

..... Date.....
Director

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DR. GILBERT C. GARLAND, *Dean and Director of Admissions*

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Northeastern University

LINCOLN INSTITUTE

**Programs in
Engineering Technology**

**1962
LETIN**

Evening Sessions

OFFICE HOURS

AUGUST 22, 1960 — JUNE 24, 1961

Monday — Friday.....8:30 A.M.-8:30 P.M.
Saturdays.....8:45 A.M.-12:00 NOON

JUNE 26, 1961 — AUGUST 19, 1961

Monday — Thursday.....8:30 A.M.-8:30 P.M.
Friday.....8:30 A.M.-4:30 P.M.

AUGUST 21, 1961 — JUNE 23, 1962

Monday — Friday.....8:30 A.M.-8:30 P.M.
Saturdays.....8:45 A.M.-12:00 NOON

INTERVIEWS

Prospective students, or those desiring advice or guidance regarding any part of the school work or curricula, are encouraged to arrange for personal interviews with the Dean or other officers of instruction. Career planning through competent guidance provides an understanding of professional requirements and develops that definiteness of purpose so vital to success.

Address communications to

DEAN DONALD H. MACKENZIE

LINCOLN INSTITUTE

NORTHEASTERN UNIVERSITY

360 Huntington Avenue, Boston 15, Massachusetts

Telephone COngress 2-1100

NORTHEASTERN UNIVERSITY

Lincoln Institute

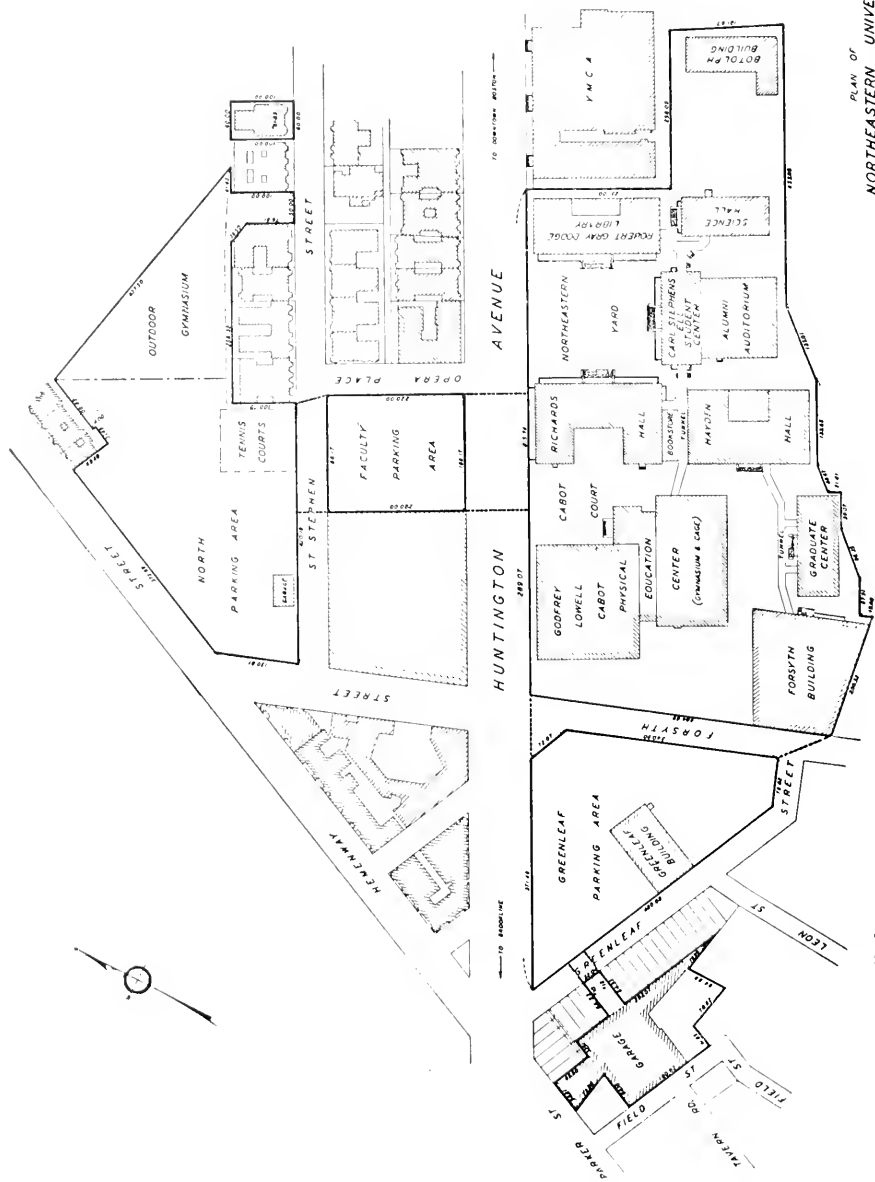
BULLETIN

1961-1962



*Evening Courses of College Grade
in Engineering Technology*

BOSTON 15, MASSACHUSETTS



PLAN OF
NORTHEASTERN UNIVERSITY
BOSTON, MASSACHUSETTS

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Northeastern University will welcome gifts and bequests for the following purposes:

- (a) For its building program.
- (b) For general endowment.
- (c) For specific purposes which may especially appeal to the donor.

It is suggested that, when possible, those contemplating gifts or bequests confer with the President of the University regarding the University's needs before legal papers are drawn.

The legal name of the University is "Northeastern University." However, in the making of gifts and bequests to Northeastern, the following wording is suggested: "Northeastern University, an educational institution incorporated under the laws of Massachusetts and located in Boston, Massachusetts."

CALENDAR

1961

Summer session classes begin	<i>May</i>	31
Commencement	<i>June</i>	18
Legal Holiday—No class sessions	<i>July</i>	4
Summer session classes end	<i>August</i>	31
Fall semester classes begin	<i>September</i>	18
Legal Holiday—No class sessions	<i>October</i>	12
Legal Holiday—No class sessions	<i>November</i>	11
Legal Holiday—No class sessions	<i>November</i>	23
Final class session before Christmas recess	<i>December</i>	21

1962

First class session after Christmas recess	<i>January</i>	2
Final examinations, fall semester	<i>January</i>	15-25
Division B and second semester classes begin	<i>January</i>	29
Legal Holiday—No class sessions	<i>February</i>	22
Legal Holiday—No class sessions	<i>April</i>	19
Final examinations, spring semester	<i>May</i>	14-24
Make-up Session for Thursday classes	<i>May</i>	21
Summer session classes begin	<i>May</i>	28
Legal Holiday—No class sessions	<i>May</i>	30

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THE STRENGTH of any educational institution lies in the quality of its faculty. This is especially true in a technical institute devoted to the training of mature men and women most of whom are already employed in their chosen professions.

The instructional staff of the Lincoln Institute is composed of men who have an active interest in the welfare of ambitious evening school students. They are men of culture and high ideals and are well qualified by training and experience to teach in their respective fields.

(As of February 1, 1961)

ARLEN W. ALLINGER *Appointed 1960*
B.S. University of California, 1958; M.S. University of California, 1960; Lieutenant, U.S.A.F., Air Force Cambridge Research Laboratories.
Applied Mechanics

GEORGE H. ANDERSON *Appointed 1956*
Commercial Art Diploma, Vesper George School of Art, 1948; Professional Artist, Portraiture and Illustration; Marine Engineering Technician, Planning, Design Division, Boston Naval Shipyard.
Engineering Drawing

PAUL A. ANDREWS *Appointed 1959*
B.A. Boston University, 1951; M.S. Northeastern University, 1957; Product Engineer, Raytheon Company.
General Chemistry

ROBERT B. ANGUS, JR. *Appointed 1948*
B.S. Northeastern University, 1947; M.S. Harvard University, 1953; P.E. (Mass.); Department Manager, Data Conversion Laboratory, Sylvania Electric Products, Inc.
Direct and Alternating-Current Theory

ROGER M. ANTOINE *Appointed 1955*
Baccalaureat, Marseille University, 1942; Licence es-Science, Marseille University, 1945; Diploma of Meteorology, Marseille University, 1946; Diploma of Engineering, Marseille School of Engineering, 1946; Assistant Professor of Mathematics, Northeastern University.
Advanced Mathematics

ROBERT J. AVERILL *Appointed 1957*
S.B. Northeastern University, 1957; M.S. Northeastern University, 1959; Cambridge Electron Accelerator, Harvard University.
Direct and Alternating-Current Machinery

RUSSELL H. BABCOCK *Appointed 1954*
S.B. Tufts College, 1945; S.M. Harvard University, 1947; Diplomate, American Academy of Sanitary Engineers; P.E. (Mass., Maine, Vermont); Manager, Water and Waste Division, The Foxboro Co., Foxboro, Mass.
Water Supply, Sewerage and Sewage Disposal

RALPH E. BACH, JR. *Appointed 1956*
B.S.E.E. Lehigh University, 1953; M.S.E.E. Northeastern University, 1957; Assistant Professor of Research in Communications, Northeastern University.
Servomechanisms

- HOLLIS BAIRD *Appointed 1945*
 Assistant Professor of Physics, Northeastern University; Consulting Engineer, Radio and Television.
Communication Engineering
Chairman of the Department of Electronic Engineering
- JOHN C. BALSAMICH *Appointed 1957*
 Massachusetts Radio School, 1956; Electronic Technician, Northeastern University.
Advanced Electronic Laboratory, Electronic Laboratory
- PAUL F. BARRITT *Appointed 1958*
 B.S. University of New Hampshire, 1948; P.E. (New Hampshire); Structural Engineer, Jackson & Moreland, Inc.
Concrete Design
- WILLIAM T. BARRY, JR. *Appointed 1956*
 Massachusetts Institute of Technology, 1930-1932; Tax Accountant, Second Bank-State Street Trust Company.
Engineering Drawing
- ROBERT T. BATHMAN *Appointed 1957*
 B.S. University of New Hampshire, 1937; M.A. University of Maine, 1950; Head of Mathematics Department, Wellesley Senior High School.
Engineering Mathematics
- G. WARREN BATES *Appointed 1949*
 B.S. Massachusetts Institute of Technology, 1926; M.A. Boston University, 1938; Instructor, Medford High School.
Pre-Engineering Mathematics, Engineering Mathematics
- ADOLPH BAUMANN *Appointed 1955*
 B.S. Kantonales Technikum, Winterthur, Switzerland, 1940; Graduate Studies, Massachusetts Institute of Technology; Project Engineer, Raytheon Company.
Communication Engineering
- STANLEY A. BLECOFF *Appointed 1957*
 A.E. Lincoln Institute, 1957; Manager, Transducer Manufacturing, Baldwin-Lima-Hamilton Corp.
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- MATTEO P. BERARDI *Appointed 1960*
 B.S. Northeastern University, 1960; Graduate Assistant, Northeastern University.
Mechanical Engineering Laboratory
- WILLIAM P. BLOINICK *Appointed 1959*
 B.S. Northeastern University, 1959; M.S. Northeastern University, 1960; Instructor of Electrical Engineering, Northeastern University.
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 B.M.E. Polytechnic Institute of Brooklyn, N. Y., 1940; P.E. (Mass.); Electrical Engineer, Boston Naval Shipyard.
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 B.S. Tufts College, 1932; M.S. Massachusetts Institute of Technology, 1933; Ed.M. Tufts College, 1937; Associate Professor of Chemistry, Northeastern University.
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 A.B. Boston College, 1933; Ed.M. Boston College Graduate School, 1937; Assistant Professor of Mathematics, Northeastern University.
Advanced Mathematics

- CHARLES H. BOUCHARD *Appointed 1957*
B.S. Worcester Polytechnic Institute, 1951; Sales Engineer, Westinghouse Electric Corporation.
Direct and Alternating-Current Theory
- KENNETH E. BOURQUE *Appointed 1959*
B.S. Northeastern University, 1958; M.S. Northeastern University, 1960; Instructor in Electrical Engineering, Northeastern University.
Dc, Ac Machinery Laboratory
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S.B., M.S. Massachusetts Institute of Technology, 1953; P.E. (Mass.); Electronic Project Engineer, Sanborn Company
Communication Engineering
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S.B. Brown University, 1954; M.S. Brown University, 1957; Senior Engineer, Baird-Atomic, Inc.
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B.S. Norwich University, 1924; M.A. Suffolk University, 1955; Head of Mathematics Department, Quincy High School.
Engineering Mathematics
- CURTIS C. BROOKS *Appointed 1937*
B.M.E. Northeastern University, 1924; A.M. Boston University, 1937; Retired.
Advanced Mathematics, Applied Mechanics
- FRANKLYN K. BROWN *Appointed 1955*
Lowell Institute, 1939; B.S.Ed. Northeastern University, 1959; Assistant Professor, Graphic Science, Northeastern University.
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B.S. University of Maryland, 1928; Ordnance Engineer, United States Army Ordnance Corps; Assistant Professor, Mechanical Engineering, Northeastern University.
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B.S. University of Massachusetts, 1940; P.E. (Mass.); Senior Engineer, Western Electric Co., North Andover, Mass.
Electrical Measurements, Alternating-Current Theory
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A.B. Boston University, 1949; Consulting Engineer.
Advanced Electronic Laboratory, Electronic Laboratory
- JAMES A. CAFFEY *Appointed 1952*
Ph.B. Boston College, 1922; M.Ed. Boston College, 1926; Instructor in Mathematics, Newman Preparatory School.
Pre-Engineering Mathematics, Engineering Mathematics
- FRANCIS J. CALLAHAN *Appointed 1948*
B.S. Northeastern University, 1948; P.E. (Mass.); Chief Engineer, Process Engineering, Inc.
Mechanical Engineering Laboratory
- ROBERT E. CAMERON *Appointed 1956*
B.S. Northeastern University, 1951; P.E. (Mass.); General Manager, Harry R. Feldman, Inc., Engineers.
Surveying

- FRANK R. CANGIANO *Appointed 1957*
 B.S. Boston University, 1957; Instructor in Science and Mathematics, Hobbs Junior High School, Medford, Mass.
Pre-Engineering Mathematics
- MICHAEL A. CANGIANO *Appointed 1946*
 S.B. Harvard University, 1933; Ed.M. Tufts College, 1949; Junior Submaster, Medford High School.
Engineering Mathematics
Chairman of the Department of Engineering Mathematics
- RICHARD I. CARTER *Appointed 1950*
 B.S. Northeastern University, 1952; M.S. Northeastern University, 1956; Assistant Professor in Electrical Engineering, and Director Computation Center, Northeastern University.
Analog and Digital Computers
- WALTER J. CASEY *Appointed 1955*
 A.B. Boston College, 1951; M.Ed. Boston Teachers College, 1952; Instructor in Mathematics, Boston Latin School.
Engineering Mathematics
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 B.S. Worcester Polytechnic Institute, 1949; M.S. Worcester Polytechnic Institute, 1950; Senior Engineer, Laboratory for Electronics.
Advanced Electron Laboratory
- PHILIP J. CLANG *Appointed 1957*
 B. S. University of Connecticut, 1950; P.E. (Mass.); Senior Engineer, Structural, Jackson & Moreland, Inc., Engineers.
Strength of Materials
- LAURENCE FULLER CLEVELAND *Appointed 1931*
 B.S. Worcester Polytechnic Institute, 1929; M.S. Massachusetts Institute of Technology, 1935; P.E. (Mass.); Professor of Electrical Engineering, Northeastern University.
Direct and Alternating-Current Machinery
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 B.S. Boston College, 1952; A.M. Boston University, 1955; Research Staff, Manufacturing Laboratories, Inc., Research Division.
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 B.S.M.E. Tufts University, 1959; Graduate Assistant, Northeastern University.
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 S.B. Massachusetts Institute of Technology, 1953; S.M. Massachusetts Institute of Technology, 1954; Sc.D. Massachusetts Institute of Technology, 1959; Structural Engineer, Watertown Arsenal Laboratory.
Applied Mechanics
- ROGER T. CONNOR *Appointed 1953*
 A.B. Boston College, 1952; M.Ed. State Teachers College, Boston, 1953; Mathematics Instructor, Boston Technical High School.
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- ROBERT J. CONNORS *Appointed 1947*
 B.S. Northeastern University, 1948; Manager, Production Engineering, Data Systems Operation, Sylvania Electric Products, Inc.
Advanced Electronic Laboratory

- ALBERT L. COYNE *Appointed 1948*
B.S. University of Maine, 1915; Ed.M. Harvard University, 1937; P.E. (Mass.);
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B.S. Northeastern University, 1937; Assistant Engineer, General Radio Co.
Advanced Electron Laboratory
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A.B. Boston University, 1931; M.A. Boston University, 1940; Associate Professor of
Mathematics, Northeastern University.
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Chairman of the Department of Advanced Mathematics
- WILLIAM P. DELANEY *Appointed 1960*
RCA Institute, 1953; B.E.E. Rensselaer Polytechnic Institute, 1957; M.E.E.
Massachusetts Institute of Technology, 1959; Staff Member, M.I.T. Lincoln
Laboratory.
Electronic Laboratory, Dc-Circuit Theory
- HORACE L. DE RIVERA *Appointed 1956*
B.S. United States Naval Academy, 1921; A.M. Boston University, 1954; Associate
Professor of Mathematics, Northeastern University.
Physics
- BERNARD W. DEVINE *Appointed 1950*
A.M.E. Lincoln Technical Institute, 1949; Superintendent of Power, American
Optical Company.
Mechanical Engineering Laboratory
- J. JAMES DEVINE *Appointed 1939*
B.S. University of Rhode Island, 1927; Sc.M. Brown University, 1936; P.E. (Mass.);
Associate Professor of Graphic Science, Northeastern University.
Engineering Drawing
Assistant Chairman of the Department of Engineering Drawing
- JOHN F. DOBBYN *Appointed 1957*
A.B. Harvard University, 1912; Ed.M. Harvard University, 1925; Master, Newman
Preparatory School.
Pre-Engineering Mathematics, Engineering Mathematics
- JEREMIAH J. DONOVAN *Appointed 1957*
A.B. Boston College, 1951; Ed.M. Boston State Teachers College, 1952; Assistant
Professor, Boston State Teachers College.
Pre-Engineering Mathematics
- H. KENNETH DOOLEY *Appointed 1957*
B.S. Boston College, 1951; Ed.M. Boston State Teachers College, 1953; Instructor
in Mathematics, Braintree High School.
Pre-Engineering Mathematics
- HENRY B. EDEN *Appointed 1957*
School of the Museum of Fine Arts, 1951; Art Director, Anco Technical Writing
Services, Inc.
Engineering Drawing

- HERBERT E. ENGL *Appointed 1958*
B.S. College of the City of New York, 1949; Senior Member, Technical Staff, Radio Corporation of America.
Electron Tubes and Circuits
- CHARLES PHILIP ENGELHARDT, JR. *Appointed 1942*
B.S. Harvard University, 1928; Master of Architecture, Harvard University, 1930; Architect, Kilham, Hopkins, Greeley & Brodie.
Machine Drawing
- BENJAMIN ERDMAN *Appointed 1960*
S.B. Northeastern University, 1958; Instructor in Electrical Engineering, Northeastern University.
Dc, Ac Circuit Theory
- HOWARD W. EVIRS, JR. *Appointed 1952*
B.S. Northeastern University, 1951; P.E. (Mass.); Assistant Executive Engineer, Fitchburg Gas and Electric Light Company, Boston.
Direct and Alternating-Current Theory
Chairman of the Department of Direct and Alternating-Current Theory
- MARTIN J. FEENEY *Appointed 1957*
B.S. Massachusetts Institute of Technology, 1931; Ed.M. Boston State Teachers College, 1938; Principal, Prince District, Boston Public Schools.
Pre-Engineering Mathematics, Engineering Mathematics
- WILLIAM D. FINAN *Appointed 1946*
A.B. Boston College, 1938; M.A. Columbia University, 1941; Instructor in English and Mathematics, Weeks Junior High School, Newton.
Pre-Engineering Mathematics
- LOUIS A. FIORE *Appointed 1956*
A.E. Lincoln Technical Institute, 1944; B.B.A. Northeastern University, 1946; Chief Draftsman, Gabriel Electronics Company.
Engineering Drawing
- EUGENE G. FORTIN *Appointed 1958*
B.A. St. Anselm's College, 1954; Engineer, Radio Corporation of America.
General and Organic Chemistry Laboratory
- EARLWOOD T. FORTINI *Appointed 1957*
Lowell Institute School, 1947; Mechanical Engineer, Photon, Inc.
Machine Design
- ARTHUR P. FREDRICKSEN *Appointed 1957*
Lincoln Institute; Industrial Engineer, Shoe Engineering Dept., United Shoe Machinery Corp.
Engineering Drawing
- JOHN L. FRIEDMAN *Appointed 1949*
S.B. Massachusetts Institute of Technology, 1932; P.E. (Mass.); Engineering Scientist, R. C. A. Missile Electronics & Control Division.
Electron Tubes and Circuits, Electronic Laboratory
Chairman of the Department of Electron Tubes and Circuits
- ROY M. MERRILL FRYE *Appointed 1930*
A.B. 1911; A.M. 1912; Ph.D. 1934, Boston University; Dean, College of Advanced Science.
Physics
- GILBERT A. GALLANT *Appointed 1960*
B.S. University of New Hampshire, 1952; Junior Structural Engineer, Jackson and Moreland.
Strength of Materials

- BRONISLAUS J. GEDREWICZ *Appointed 1956*
B.S. Massachusetts Institute of Technology, 1931; Designer, Small Aircraft Engine Department, General Electric Company.
Engineering Drawing
- DAVID J. GHIGLIO *Appointed 1960*
S.B. Northeastern University, 1959; Graduate Assistant, Northeastern University.
Mechanical Engineering Laboratory
- ALVIN L. GLICK *Appointed 1958*
B.S. Polytechnic Institute of Brooklyn, 1953; M.S. Rutgers University, 1955; Engineer, Raytheon Company.
Semiconductors and Transistors, Electronic Physics
- LAWRENCE A. HAINES *Appointed 1956*
A. E. Lincoln Technical Institute, 1953; Manager of Sales Training, Mason-Neilan Division, Worthington Corporation.
Engineering Drawing
- JOSEPH L. HALLETT, JR. *Appointed 1958*
S.B. Northeastern University, 1955; Project Engineer, Sylvania Electric Products.
Electronic Laboratory
- FRANK A. HAMILTON *Appointed 1947*
A. E. Lincoln Technical Institute, 1939; Structural Engineer, Jackson & Moreland, Inc.
Structural Drawing
- ALDEN G. HANDY *Appointed 1957*
B.S. Boston University, 1924; M.A. Boston University, 1936; Consultant, Optics.
Physics
- FRANCIS R. HANKARD *Appointed 1946*
S.B. Northeastern University, 1946; M.A. Boston University, 1949; Chemist, State Police Laboratories.
Physics
- HARRY N. HARDSOG *Appointed 1958*
B.S., M.S. Massachusetts Institute of Technology, 1929; P.E. (Mass.); Assistant Professor of Physics, Northeastern University.
Physics
- ROBERT L. HARRINGTON *Appointed 1948*
B.M.E. Clarkson College of Technology, 1939; M.S. Case Institute, 1941; P.E. (Mass.); Associate Professor of Mechanical Engineering, Tufts University.
Heat Engineering
- ERIC HARRISON *Appointed 1949*
Wentworth Institute, 1920; B.S. Suffolk University, 1937; M.A. Suffolk University, 1951; Instructor in Mechanical Drawing, Medford High School.
Engineering Drawing
- DAVID E. HIGGINBOTHAM *Appointed 1948*
B.S. Northeastern University, 1944; S.M. Massachusetts Institute of Technology, 1948; Associate Professor of Electrical Engineering, Tufts University.
Electronics for Industry Laboratory, AC-Machinery Laboratory II
- PERCY H. HILL *Appointed 1950*
B.M.E. Rensselaer Polytechnic Institute, 1944; M.S. Harvard University, 1951; P.E. (Mass.); Professor and Chairman of Department of Engineering Graphics, Tufts University.
Mechanism

- ROBERT EDGAR HODGDON *Appointed 1927*
B.S. University of New Hampshire, 1917; M.S. Massachusetts Institute of Technology, 1931; Retired.
Physics
- ERHARD J. HOFMANN *Appointed 1956*
B.E.E. 1954, Polytechnic Institute of Brooklyn; Staff Engineer, Lincoln Laboratory, Massachusetts Institute of Technology.
Direct and Alternate-Current Theory, Electronic Laboratory
- RICHARD W. HUBBARD *Appointed 1957*
B.S. University of Massachusetts, 1935; Ed.M. Harvard University, 1945; Graduate School, Northeastern University; Instructor in Mathematics, Newton South High School, Newton, Mass.
Pre-Engineering Mathematics
- EVERETT L. HUME *Appointed 1950*
B.S. 1933, M.S. 1933, Massachusetts Institute of Technology; P.E. (Mass.); Engineer, Jackson & Moreland, Inc.
Hydraulics
- MARTIN IDELSON *Appointed 1956*
B.S.Ch. Polytechnic Institute of Brooklyn, 1952; Ph.D. Polytechnic Institute of Brooklyn, 1955; Scientist, Polaroid Corporation.
Organic Chemistry
- CARROLL I. JOHNSON *Appointed 1956*
S.B. Massachusetts Institute of Technology, 1950; M.S. Northeastern University, 1958; P.E. (Mass. & Wash.); Production Manager, Emerson & Cuming, Inc.
Applied Mechanics
- A. LOUIS KARP *Appointed 1956*
A.B. Harvard College, 1927; Ed.M. Boston University, 1931; Principal, Boston School Department.
Pre-Engineering Mathematics, Engineering Mathematics
- ROBERT J. KATES, JR. *Appointed 1960*
B.S. Northeastern University, 1957; Instructor in Graphic Science, Northeastern University.
Mechanism
- LOUIS KATONA *Appointed 1959*
B.C.E. College of the City of New York, 1944; M.C.E. Polytechnic Institute of Brooklyn, 1948; P.E. (Mass. and N. Y.); Hydraulic and Sanitary Engineer, Badger Mfg. Co.
Hydraulics
- CHARLES W. KAUFMAN *Appointed 1958*
B.S. Bridgewater Teachers College, 1939; Ed.M. Boston University, 1940; M.N.S. Worcester Polytechnic Institute, 1960; Science Teacher, Brighton High School.
Physics
- JOHN T. KEIRAN *Appointed 1957*
A.B. Boston College, 1933; A.M. Harvard University, 1935; Master, Boston Latin School.
Engineering Mathematics
- BERNARD J. KILEY *Appointed 1958*
B.E. 1953, M.E. 1954, Yale University; P.E. (Mass.); Structural Designer, Clarke-engineering Company, Inc.
Applied Mechanics

- MARK M. KILEY *Appointed 1955*
B.E. Yale University, 1948; M.E. Yale University, 1949; P.E. (Mass., R. 1.); Consulting Engineer.
Strength of Materials.
- WILLIAM F. KING *Appointed 1957*
B.S. Northeastern University, 1957; M.S. Northeastern University, 1959; Assistant Professor of Research, Northeastern University.
Advanced Electronic Laboratory, Direct-Current Theory
- JOHN J. KLEIN *Appointed 1950*
B.S. Northeastern University, 1949; M.S. Northeastern University, 1955; Leader (Advanced Circuit Development), Missile Electronics and Control Division, Radio Corporation of America.
Transistor Circuit Engineering
- BORAH L. KREIMER *Appointed 1954*
B.S. North Carolina State College, 1940; Ed.M. Northeastern University, 1956; Assistant Professor of Graphic Science, Northeastern University.
Engineering Drawing
- HORATIO W. LAMSON *Appointed 1945*
B.S. Massachusetts Institute of Technology, 1915; M.A. Harvard University, 1917; P.E. (Mass.); Research Engineer, Emeritus, General Radio Company.
Alternating-Current Theory, Electrical Measurements
- HERBERT C. LANG *Appointed 1936*
B.S. Northeastern University, 1934; P.E. (Mass.); Chief Draftsman, Mason-Neilan Division of Worthington Corporation.
Machine Drawing
Chairman of the Department of Machine Drawing
- ROBERT S. LANG *Appointed 1955*
B.S. Northeastern University, 1945; Ed.M. Boston University, 1954; Assistant Professor of Graphic Science, Northeastern University.
Engineering Drawing
- ARISTOTLE T. LASKARIS *Appointed 1960*
A.B. Boston University, 1954; M.S. Northeastern University, 1956; Research Chemist, Dewey and Almy Chemical Co.
Qualitative and Quantitative Chemistry Laboratory
- EARLE R. LASTE, JR. *Appointed 1958*
B.S. Northeastern University, 1957; M.S. Northeastern University, 1959; Assistant Professor of Electrical Engineering, Northeastern University.
Transients in Linear Systems
- CLARENCE E. LEBELL *Appointed 1955*
Lowell Institute, 1940; Mechanical and Electrical Engineering Designer, Aircraft Gas Turbine Division, General Electric Co.
Engineering Drawing
- JOHN ROBERT LEIGHTON *Appointed 1915*
B.C.E. Northeastern University, 1914; Head of Department of Strength of Materials, Wentworth Institute.
Applied Mechanics, Strength of Materials
Chairman of Department of Strength of Materials.
- NICHOLAS J. LEMBO *Appointed 1953*
B.S. Boston College, 1951; Ed.M. Boston Teachers College, 1952; Assistant Professor of Physical Science, State Teachers College at Boston.
Pre-Engineering Mathematics, Engineering Mathematics

- DEMIETRE P. LIGOR *Appointed 1959*
B.S.E.E. Massachusetts Institute of Technology, 1949; P.E. (Mass.); Manager, Technical Training, Baldwin-Lima-Hamilton Corp.
Wave Propagation, Semiconductors and Transistors
- EDWARD F. LOBACZ *Appointed 1951*
B.S.C.E. Northeastern University, 1943; M.S.C.E. Harvard University, 1948; P.E. (Mass.); Supervisory Civil Engineer, (S.M.) U. S. Army Engineer Division, New England
Structural Analysis
- ANDREW G. LOFGREN *Appointed 1946*
Lowell Institute, 1932; A.A. Harvard University, 1942; Ed.M. Boston University, 1946; Staff Appointment, Instrumentation Laboratory, Massachusetts Institute of Technology.
Engineering Drawing
- BERTRAM S. LONG *Appointed 1952*
B.S. Northeastern University, 1949; M.S. Northeastern University, 1954; Assistant Professor of Mechanical Engineering, Northeastern University.
Mechanical Engineering Laboratory
- ROGER G. LONG *Appointed 1952*
A.E. Lincoln Technical Institute, 1950; Graduate Study, Harvard University, 1950-51; B.B.A. Northeastern University, 1953; Chief Engineer, General Communication Company.
Advanced Electronic Laboratory
- KENNETH A. LUCAS *Appointed 1950*
S.B. Massachusetts Institute of Technology, 1925; M.Ed. Boston University, 1931; P.E. (Mass.); Reg. Land Surveyor (Mass.); Civil Engineer, Whitman & Howard, Inc.
Surveying
- JOHN F. LUTKEVICH *Appointed 1956*
A.E. Lincoln Technical Institute, 1952; B.B.A. Northeastern University, 1954; Engineer, Sylvania Electric Products, Inc.
Machine Drawing, Engineering Drawing
- ANDREW C. MACAULAY, JR. *Appointed 1960*
B.S. Northeastern University, 1953; M.S. Northeastern University, 1957; Product Engineer, Semiconductor Division, Raytheon Company.
General Chemistry
- ALEXANDER MACMULLEN *Appointed 1956*
B.S. Massachusetts Institute of Technology, 1951; M.S. Massachusetts Institute of Technology, 1951; Section Manager, Raytheon Company.
Electronic Physics, Electronic Laboratory
- RICHARD MADDEN *Appointed 1960*
B.S. Northeastern University, 1960; Graduate Assistant, Northeastern University.
Mechanical Engineering Laboratory
- ALVIN MANDELL *Appointed 1950*
B.E.E. College of the City of New York, 1943; P.E. (Mass.); M.S. Northeastern University, 1955; Supervisor, Boeing Airplane Company.
Advanced Electronic Laboratory
- JACK I. MANN *Appointed 1960*
B.S.C.E. Munich Polytech, 1951; M.S. Northeastern University, 1959; Structural Engineer, Clarkeson Engineering Co., Inc.
Strength of Materials

- ARTHUR J. MARCHAND, JR. *Appointed 1955*
S.B. 1955, M.S. 1958, Northeastern University; Engineer, Bethlehem Steel Company.
Mechanical Engineering Laboratory
- ROBERT C. MARINI *Appointed 1960*
B.S. Northeastern University, 1954; M.S. Harvard University, 1955; P.E. (Mass.);
Junior Engineer, Metcalf & Eddy.
Hydraulics
- PASQUALE A. MARINO *Appointed 1959*
B.S. Northeastern University, 1956; P.E. (Mass.); Instructor in Mechanical Engineering, Northeastern University.
Heat Engineering
- ALEXANDER G. MARSHALL, JR. *Appointed 1957*
A.B. Middlebury College, 1951; M.A. Boston University, 1954; Mathematics
Instructor, Lincoln-Sudbury Regional High School.
Engineering Mathematics
- R. PAUL MASTROCOLA *Appointed 1957*
S.B. Northeastern University, 1957; Mechanical Engineer, Raytheon Company.
Mechanical Engineering Laboratory
- JOHN D. MAZGLIS *Appointed 1957*
Industrial Technical Institute, 1956; Customer Engineer, International Business
Machines Corp.
Electronic Laboratory
- FRANCIS T. McCABE *Appointed 1952*
B.S. University of Maine, 1917; Ed.M. Harvard University, 1928; Formerly Head-
master, Rindge Technical School.
Engineering Drawing
- EDWARD F. MCCARREN, JR. *Appointed 1951*
A.E.E. Lincoln Technical Institute, 1951; Assistant Engineer, Baldwin-Lima-
Hamilton Corp.
Advanced Electronic Laboratory
- VERNON S. MCFARLIN *Appointed 1953*
B.E.E. Northeastern University, 1931; P.E. (Mass.); Supervising Engineer, Boston
Edison Company
Engineering Mathematics
- ALAN McLAUGHLIN *Appointed 1960*
B.S. Northeastern University, 1957; M.S. Northeastern University, 1959; Project
Engineer, Contronics, Inc.
Semiconductors and Transistors
- EUGENE L. McLAUGHLIN *Appointed 1956*
A.B. Boston College, 1929; M.A. Boston College Graduate School, 1931; Head of
Mathematics Department, Hyde Park High School.
Engineering Mathematics
- ROBERT F. McMAHON *Appointed 1956*
B.S. University of Maine, 1953; M.S. Harvard University, 1954; Assistant Sales
Manager, Keléket X-Ray Division, Tracerlab, Inc.
Engineering Mathematics
- CARL J. McLEA *Appointed 1960*
S.B. Northeastern University, 1949; M.S. Northeastern University, 1960; Assistant
Chief Structural Engineer, Clarkeson Engineering Co.
Structural Analysis
- ROBERT L. MESERVE *Appointed 1954*
S.B. Northeastern University, 1951; L.S. (Mass.); Project Engineer, Camp, Dresser
& McKee.
Surveying

- CARL MILLER *Appointed 1945*
A.B. Harvard University, 1929; LL.B. Boston University, 1933; Ed.M. Boston Teachers College, 1935; Assistant Principal, Boston School Department.
Engineering Mathematics, Pre-Engineering Mathematics
Chairman of Department of Pre-Engineering Mathematics
- KNOWLTON MILLER *Appointed 1958*
A.B. Harvard University, 1958; Engineer, Radio Corporation of America.
Electron Tubes and Circuits
- RICHARD W. MILLER *Appointed 1959*
B.S. Northeastern University, 1958; M.S. Northeastern University, 1960; Assistant Works Manager, Walworth Company.
Mechanical Engineering Laboratory
- ERNEST E. MILLS *Appointed 1947*
B.S. Northeastern University, 1946; M.S. Northeastern University, 1954; P.E. (Mass.); Associate Professor of Mechanical Engineering, Northeastern University.
Mechanical Engineering Laboratory
- FRANCIS J. MONTEGANI *Appointed 1960*
B.S. Northeastern University, 1960; Teaching Fellow, Northeastern University.
Mechanical Engineering Laboratory
- ROBERT L. MOYNIHAN *Appointed 1959*
S.B. Northeastern University, 1959; Instructor in Electrical Engineering, Northeastern University.
Advanced Electronic Laboratory
- JULIAN S. NATANSON *Appointed 1957*
Franklin Technical Institute, 1937-1941; Lowell Institute, 1943; P.E. (Mass.); Research and Development Department, Keystone Manufacturing Co.
Machine Drawing
- JOHN R. O'BRIEN *Appointed 1946*
A.B. Boston College, 1933; A.M. Boston College, 1934; Head of Mathematics Dept., English High School, Boston.
Advanced Mathematics
- JOHN N. OSTIS *Appointed 1955*
A.E. Lincoln Institute, 1953; B.B.A. in E. & M., Northeastern University, 1954; Staff Engineer, Mitre Corporation.
Advanced Electronic Laboratory
- THOMAS J. OWENS *Appointed 1952*
A.B. Boston College, 1943; Instructor in Mathematics, Quincy High School.
Advanced Mathematics
- NORMAND A. PAQUETTE *Appointed 1958*
A.E. Lincoln Institute, 1956; B.B.A. Northeastern University, 1958; Sales and Applications Engineer, Yewell Associates, Inc.
Electronic Laboratory
- WILLIAM M. PARKER *Appointed 1957*
LL.B. Northeastern University, 1925; A.E. Lincoln Institute, 1956; Mechanical Engineer, Minneapolis-Honeywell Regulator Co., Boston Division.
Engineering Mathematics
- WILLIAM H. PARMENTER *Appointed 1952*
A.E. Lincoln Technical Institute, 1948; B.B.A. Northeastern University, 1952; Engineer, Baird-Atomic Inc.
Advanced Electronic Laboratory
- DONALD PATERSON *Appointed 1959*
B.S. Northeastern University, 1958; M.S. Northeastern University, 1960; Research Assistant, Harvard School of Public Health.
Mechanical Engineering Laboratory

- BERNARD D. PERRY *Appointed 1959*
B.E.E. Rensselaer Polytechnic Institute, 1952; M.S. Northeastern University, 1956;
Technical Staff Member, Mitre Corporation.
Electron Tubes and Circuits
- CHAUNCEY S. PERRY *Appointed 1957*
B.S. Northeastern University, 1957; M.S. Northeastern University, 1959; Assistant
Project Engineer, Raytheon Company.
Mechanical Engineering Laboratory
- RICHARD W. PETERSON *Appointed 1960*
S.B. Northeastern University, 1952; Instructor, Wentworth Institute.
Qualitative and Quantitative Chemistry
- CHARLES H. PRICE, JR. *Appointed 1960*
B.S. Northeastern University, 1955; M.S. Northeastern University, 1960; Elec-
tronics Research Associate, Northeastern University.
Semiconductors
- SIDNEY F. QUINT *Appointed 1954*
S.B. Northeastern University, 1946; S.M. Massachusetts Institute of Technology,
1950; P.E. (Mass.); Development Engineer and Group Leader, Raytheon Company.
Electron Tubes and Circuits
- GERARD H. RATCLIFFE *Appointed 1955*
A.B. Boston University, 1949; Research Engineer, Sylvania Electric Products, Inc.
Advanced Electronic Laboratory
- RICHARD S. RICE *Appointed 1951*
S.B. Thayer School of Civil Engineering, Dartmouth College, 1943; M.S. Massa-
chusetts Institute of Technology, 1947; P.E. (Mass.); Structural Engineer, Jackson
& Moreland, Inc., Engineers.
Concrete Design
- EDWARD L. RICH *Appointed 1956*
B.S. Northeastern University, 1952; M.S. Northeastern University, 1956; Project
Engineer, Sylvania Electric Products, Inc.
Heat Engineering, Strength of Materials
- DAVID E. ROSENGARD *Appointed 1946*
A.B. Harvard College, 1931; A.M. Harvard University, 1932; Head of Mathematics
Department, Girls Latin School, Boston.
Advanced Mathematics
- BARNET RUDMAN *Appointed 1942*
A.B. Harvard University, 1921; Ed.M. Boston Teachers College, 1934; Associate
Professor of Mathematics, Northeastern University.
Advanced Mathematics
- WILFRED P. RULE *Appointed 1957*
S.B. Tufts University, 1953; M.S. Massachusetts Institute of Technology, 1957;
Assistant Professor of Engineering Graphics, Tufts University.
Mechanism
- RICHARD M. RUSH *Appointed 1956*
S.B. United States Naval Academy, 1918; M.S. Massachusetts Institute of Tech-
nology, 1922; Associate Professor of Physics, Northeastern University.
Physics
- FRANK W. SARNOW, JR. *Appointed 1948*
B.S. 1939, B.B.A. 1954, Ed.M. 1958, Northeastern University; P.E. (Mass.); L.S.
(Mass.); Deputy Chief, Plant Facilities Office, Watertown Arsenal.
Structural Drawing
- FRANCIS SATTIN *Appointed 1959*
B.S. Northeastern University, 1943; P.E. (Mass.); Structural Design Engineer,
Badger Manufacturing Company.
Structural Design

- HENRY SCHWARTZ *Appointed 1958*
A.B. University of California, 1939; M.Ed. Teachers College, North Adams, 1944;
P.E. (Mass.); Field Engineer.
Physics
- CHARLES F. SEAVERN *Appointed 1941*
Harvard University, 1915-17; Associate in Engineering, Lincoln Institute, 1944;
Graduate work in Education, Boston University, 1945-47; Retired.
Engineering Drawing
- HAROLD M. SHARAF *Appointed 1955*
B.S., M.S. Massachusetts Institute of Technology, 1952; President, Tenco Electronics, Inc.
Communication Engineering
- ARNOLD G. SHARP *Appointed 1960*
B.S. Tufts University, 1946; M.S. Worcester Polytechnic Institute, 1953; Research Engineer, Woods Hole Oceanographic Institute.
Applied Mechanics
- FREEMAN D. SHEPHERD, JR. *Appointed 1959*
B.S. Massachusetts Institute of Technology, 1959; M.S. Massachusetts Institute of Technology, 1960; Electronic Research Specialist, Air Force Cambridge Research Center.
Electronic Physics, Semiconductors and Transistors
- JOSEPH SIMONS *Appointed 1956*
B.S. Boston University, 1950; M.Ed. Boston University, 1953; Supervisor of Apprentice Training, Boston Naval Shipyard.
Advanced Mathematics
- GORDON N. SMITH *Appointed 1957*
B.S. Massachusetts Institute of Technology, 1954; P.E. (R. I.); Engineering Manager, Monitor and Control Division, Fenwal Corporation.
Communication Engineering
- ERNEST L. SPENCER *Appointed 1941*
B.S. Northeastern University, 1936; M.S. Harvard University, 1943; P.E. (Mass.); R.L.S. (Mass.); Professor of Civil Engineering, Northeastern University.
Chairman of the Department of Civil Engineering
Structural Analysis
- TIMOTHY J. SPILLANE *Appointed 1960*
A.B. Holy Cross, 1942; Ed.M. Boston State College, 1949; Harvard Graduate School of Education, 1958; Head of Science Department, Hyde Park High School.
Physics
- S. LEONARD SPITZ *Appointed 1955*
B.S. Northeastern University, 1946; P.E. (Mass.); Senior Engineer, Avco Everett Research Laboratory.
Heat Engineering
- RAY S. STATA *Appointed 1960*
B.S. Massachusetts Institute of Technology, 1957; M.S. Massachusetts Institute of Technology, 1958; Field Engineer, Yewell Associates, Inc.
Semiconductors
- FREDERICK ARLINGTON STEARNS *Appointed 1921*
B.S. 1917, M.S. 1934, Massachusetts Institute of Technology; P.E. (Mass.); Professor of Mechanical Engineering, Northeastern University.
Heat Engineering
Chairman of the Department of Mechanical Engineering
- ROBERT B. STITT *Appointed 1959*
B.B.A. Northeastern University, 1959; Senior Engineer, Edgerton, Germeshausen & Grier, Inc.
Electronic Laboratory

- LAWRENCE R. SWAIN, JR. *Appointed 1960*
S.B. Northeastern University, 1958; M.S. Massachusetts Institute of Technology, 1960; Research Engineer, Electronic Systems Laboratory, Massachusetts Institute of Technology.
Dc, Ac Theory
- MAURICE TEMPLE *Appointed 1956*
S.B. Northeastern University, 1947; M.Ed. Boston Teachers College, 1952; Senior Instructor in Science, Boston Public Schools.
Pre-Engineering Mathematics, Engineering Mathematics
- VAHAN V. TERZIAN *Appointed 1960*
B.S. Northeastern University, 1951; M.S. Northeastern University, 1956; Engineer in Charge, Sylvania Electric Products, Inc.
Communication Engineering
- ROBERT L. THING *Appointed 1957*
B.S. 1943, M.S. 1951, University of Illinois; Development Engineer, Mason-Neilan Division, Worthington Corporation.
Electron Tubes and Circuits
- PHINEAS TOBE *Appointed 1960*
A.B. Harvard College, 1932; Ed.M. Boston Teachers College, 1935; Head of Science Department, East Boston High School.
Physics
- FRANK E. TRUESDALE *Appointed 1957*
B.S. University of Massachusetts, 1950; Assistant Professor in Graphic Science, Northeastern University.
Engineering Drawing
- ARTHUR M. VUILLEUMIER *Appointed 1953*
Instructor in Electronics, Massachusetts Trade School; Supervisor, L. M. Herman Company, R. C. A. Sound Division Section.
Advanced Electronic Laboratory
- RICHARD WADLER *Appointed 1953*
A.M.E. Lincoln Technical Institute, 1947; P.E. (Mass.); Senior Engineer, Raytheon Company.
Machine Design
- THOMAS H. WALLACE *Appointed 1941*
S.B. Boston University, 1933; M.A. Harvard Graduate School, 1936; Ph.D. Boston University, 1939; Professor of Physics, Northeastern University.
Physics
Chairman of the Department of Physics
- JOHN E. WALSH *Appointed 1947*
A.B. St. Michael's College, 1938; A.M. Boston University, 1940; Head, Advanced Antenna Research Section, Pickard & Burns, Inc.
Advanced Mathematics
- JOHN L. WARNER *Appointed 1948*
B.S. Tufts College, 1942; M.S. Harvard University, 1950; Associate Professor of Electrical Engineering, Tufts University.
Transmission Line Theory, Electronics for Industry
- GEORGE E. WASHEURN *Appointed 1957*
S.B. Massachusetts Institute of Technology, 1909; Ph.D. University of Berlin, 1914; Retired.
Physics
- CHARLES I. WATERMAN *Appointed 1956*
B.S.E.E. Northeastern University, 1947; M.S.E.E. Harvard University Graduate School of Engineering, 1948; P.E. (Mass.); Senior Engineer, Raytheon Company.
Direct and Alternating-Current Theory

- FRANK S. WEINFERT *Appointed 1957*
A.B. Harvard College, 1948; B.S. Columbia University, 1951; M.S. Columbia University, 1952; Optometrist.
Engineering Mathematics
- MORTON D. WEINFERT *Appointed 1955*
A.B. Harvard University, 1938; Ed.M. Boston Teachers College, 1939; Mathematics Master, Boston Latin School.
Advanced Mathematics
- GEORGE B. WELCH *Appointed 1946*
B.S. Bowdoin College, 1922; Ph.D. Cornell University, 1928; Professor of Physics, Northeastern University.
Wave Propagation, Semiconductors and Transistors
- RALPH A. WELLINGS *Appointed 1955*
B.S. Boston College, 1955; M.Ed. State College at Boston, 1960; Mathematics Instructor, Boston Public Schools.
Engineering Mathematics
- RALPH E. WELLINGS *Appointed 1944*
A.B. Boston College, 1920; A.M. Boston College, 1925; Ed.M. Boston Teachers College, 1930; Head of Science Department, Brighton High School.
Physics
- KARL H. WEST, JR. *Appointed 1956*
B.S. Northeastern University, 1950; M.Ed. Boston Teachers College, 1951; Instructor in Mathematics, Needham High School.
Engineering Mathematics
- THOMAS F. WHITE *Appointed 1957*
B.S. Mathematics, Boston College, 1951; B.S. Massachusetts Maritime Academy, 1952; M.Ed. Bridgewater State Teachers College, 1952; Instructor of Mathematics, Quincy High School.
Engineering Mathematics
- WILLARD B. WHITTEMORE *Appointed 1957*
B.S. in C.E. Massachusetts Institute of Technology, 1932; Ed.M. Boston University, 1946; C.A.G.S. Boston University, 1956; Instructor in Mathematics, Everett High School.
Pre-Engineering Mathematics
- JOSEPH F. WILLARD *Appointed 1949*
S.B. Northeastern University, 1949; P.E. (Mass.); L.S. (Mass.); Assistant Civil Engineer, Electronic Computer Development, Massachusetts Department of Public Works.
Transportation Engineering
- ALBERT G. WILSON, JR. *Appointed 1948*
B.S. in Civil Engineering, Thayer School, Dartmouth, 1946; M.S. Case Institute of Technology, 1948; P.E. (Mass.); S.E. (Ill.); Chief Structural Engineer, Anderson-Nichols Co.
Applied Mechanics
Chairman of Department of Applied Mechanics
- ROBERT D. WRIGHT *Appointed 1955*
A.E. Lincoln Institute, 1955; Graduate Study, Northeastern University; Senior Engineer, Data Systems Operations, Sylvania Electric Products, Inc.
Electron Tubes and Circuits, Advanced Electronic Laboratory
- ALVIN J. YORRA *Appointed 1956*
B.S. Northeastern University, 1954; M.S. Massachusetts Institute of Technology, 1956; Assistant Professor of Mechanical Engineering, Northeastern University.
Mechanical Engineering Laboratory
- JOSEPH W. ZULLER *Appointed 1950*
B.S. 1908, M.E. 1938, Tufts University; P.E. (Mass.); Professor Emeritus of Mechanical Engineering, Northeastern University.
Machine Design

NORTHEASTERN UNIVERSITY

AIMS AND SCOPE OF THE UNIVERSITY

Founded in 1898, Northeastern University is incorporated as a privately endowed nonsectarian institution of higher learning under the General Laws of Massachusetts. The State Legislature by special enactment has given the University general degree-granting powers. The University is governed by a Board of Trustees who are elected by and from the Northeastern University Corporation which is comprised of more than a hundred and twenty-five distinguished business and professional men.

From its beginning Northeastern University has had as its dominant purpose the discovery of community educational needs and the meeting of these in distinctive and serviceable ways. The University has not duplicated the programs of other institutions, but has sought to pioneer new areas of educational service.

A distinctive feature of Northeastern University is its Co-operative Plan, initiated by the College of Engineering in 1909 and subsequently adopted by the Colleges of Business Administration (1922), Liberal Arts (1935), and Education (1953). This serviceable educational method enables students to gain valuable practical experience as an integral part of their college programs and also provides the means by which they may contribute substantially to the costs of their education. The Plan has been extended to the graduate level in several fields of engineering in co-operation with industrial corporations located throughout the United States.

In the field of adult education, programs of study have been developed to meet a variety of needs. Since 1906 evening curricula have been offered leading to the bachelor's degree in business. This program has been carefully planned to serve mature students who are employed full time during the day but who are desirous of broadening their educational background by part-time study. Similar evening programs in the arts and sciences, in engineering, and in teacher education have been added in recent years. All formal courses of study leading to degrees through evening programs are approved by the appropriate college faculty and are subject to the same quantitative and qualitative standards as the regular day curricula.

The following is a brief outline of the aims and scope of the University's programs.

I. The Five Colleges

1. The College of Liberal Arts

The College of Liberal Arts offers majors in the usual fields of the arts and sciences leading to the degrees of Bachelor of Arts and Bachelor of Science. With the exception of pre-professional programs, day curricula are normally five years in length and operated on the Co-operative Plan. In all majors except chemistry and physics, however, qualified students with the approval of the dean may elect to complete requirements for the degree on a full-time plan in four years. The College also offers a number of its courses during evening hours, constituting a program leading to the Bachelor of Arts degree with curricula in economics, English, history, political science, and sociology.

2. The College of Education

The College of Education offers the option of study on the conventional four-year full-time plan or on the five-year Co-operative Plan which provides for a period of teacher internship in various school systems of the Greater Boston area. Both programs lead to the degree of Bachelor of Science in Education and are designed particularly to meet the needs of high school graduates who desire to prepare themselves for teaching or administrative positions in elementary and secondary schools.

The College also offers evening curricula leading to the degree of Bachelor of Science in Education in co-operation with the College of Liberal Arts.

3. The College of Business Administration

The College of Business Administration offers day programs of study in the principal fields of business leading to the degree of Bachelor of Science in Business Administration. The day programs are offered on the five-year Co-operative Plan under which students gain substantial practical experience in the fields for which they are preparing as an integral part of their undergraduate course of study.

4. *The College of Engineering*

The College of Engineering offers five-year co-operative curricula in civil, mechanical, electrical, chemical, and industrial engineering leading to the degree of Bachelor of Science with specification according to the engineering department in which the student qualified.

The College also offers during evening hours a full program leading to the degree of Bachelor of Science in Electrical Engineering. This program extends over nine years, covers the identical courses given in the day co-operative curriculum, and meets the same qualitative and quantitative standards of scholarship.

5. *University College*

University College, so called because it draws upon the resources of the other Colleges of the University, offers courses of study leading to certificates, associate degrees, or to the Bachelor of Science degree. Programs of the College are designed specifically to meet the needs of older, more mature students who wish to undertake part-time programs of education during evening hours.

Although it is exclusively an evening College, the quality standards of instruction and the requirements for its degree are wholly consistent with those of the other Colleges of Northeastern University. University College does not duplicate the offerings of the Colleges of Liberal Arts, Business Administration, Education, and Engineering, but provides curricula which cut across traditional subject matter areas and meet the particular needs of adults desiring formal programs of professional development on a part-time basis.

II. The Graduate School

The Graduate School of the University offers day and evening programs of study leading to appropriate master's degrees in arts and sciences, education, business, and engineering; and to Ph.D. degrees in physics, chemistry, and electrical engineering. Some of these programs are offered on the Co-operative Plan; others provide teaching and research fellowships for able candidates. Administrative headquarters for all graduate programs are located on the first floor of the Graduate Center Building, where the offices of the dean and of the several directors of professional programs are located.

III. Lincoln Institute

Lincoln Institute offers evening programs of study in several fields of science and engineering technology leading to the degree of Associate in Science or Associate in Engineering. The courses of study are of college grade and cover much of the technological subject matter customarily included in schools of engineering, but the curricula are less extensive in scope than those required for the baccalaureate degree in engineering. They prepare students to work with professional engineers in various technical capacities.

IV. Adult and Continuing Education

The Office of Adult and Continuing Education provides special programs and services for the business and industrial community. These include programs in management development and seminars, conferences, institutes, and forums designed to communicate information about current trends in various areas. The Office also sponsors the Bureau of Business and Industrial Training, which sets up both off-campus and on-campus, short-term, non-credit courses to meet the specific training needs of industrial organizations in New England.

V. Research Activities

The faculty of the University are engaged in a wide variety of basic research projects in business, science, social science, and engineering. These are co-ordinated by the Dean of Research Administration, whose services are University-wide and available to the faculties of all the Colleges.

Although Northeastern is primarily concerned with undergraduate and graduate instruction in the areas of arts and sciences, business, engineering, and teacher education, the University believes that the most effective teaching and learning takes place in an environment characterized by research activities directed toward extending the frontiers of knowledge.

BUILDINGS AND FACILITIES

University Buildings

LOCATION

Northeastern University is located on Huntington Avenue in the Back Bay section of Boston. The main administrative offices of the University are located in Richards Hall.

The chief railroad centers of Boston are the North and South Stations. To reach the University from the North Station, board an MTA subway car going to Park Street and transfer there to any Huntington Avenue car. To reach the University from South Station, board a Cambridge-bound subway train and transfer at Park Street to a Huntington Avenue car. The "Northeastern" station is the first stop outside the subway.

HUNTINGTON AVENUE CAMPUS

The principal educational buildings of Northeastern University are located on a sixteen-acre site in the Back Bay section of Boston. Only one block to the west of the University lie the famous Boston Museum of Fine Arts and the beautiful public gardens-park reservation known as "The Fenway." The newer buildings of the Huntington Avenue Campus are pictured on page 4.

Following a long-range development plan, University facilities have expanded substantially in recent years. In addition to the seven buildings constructed within the last two decades, several modernized older buildings are available for specialized uses. The newer buildings on the campus are interconnected by means of tunnels, so that the students may go from building to building without going out of doors in inclement weather.

In addition to classrooms and instructional offices, the principal buildings include the following:

Botolph Building—Civil Engineering Laboratories

Cabot Physical Education Center—Gymnasium, Cage, Rifle Range

Dodge Library—Library, Drawing Rooms

Ell Student Center—Student Activities, Chapel, Auditorium, University Commons

Forsyth Building—Industrial and Mechanical Engineering Laboratories, Health Service

Graduate Center—Administrative Offices of the Graduate School, Physics Laboratories, Cafeteria

Greenleaf Building—ROTC Headquarters, Research Facilities

Hayden Hall—Offices of the University College, Adult and Continuing Education, and Lincoln Institute; Business, Education, and Electrical Engineering Laboratories; Art Studio

Richards Hall—Administrative Offices, Mechanical Engineering, Psychology, and Chemistry Laboratories, Bookstore

Science Hall—Chemical Engineering and Biology Laboratories

GENERAL INFORMATION

STUDENT BODY

THE STUDENTS of the Lincoln Institute represent men and women of earnest purpose and firm endeavor who bring to bear on their work a thoroughness which promises future success. Their ages last year ranged from seventeen to fifty-two, the average age being twenty-six years. Almost all the students are engaged in work during the day and many different occupations have their representatives in the student body, a fact which demonstrates that the Institute can be of service to men in many walks of life. Some students are preparing to enter engineering work; many are already engaged in engineering work and are studying to prepare themselves for increased responsibility and rewards.

TRANSPORTATION

THE RAILROAD SYSTEMS entering Boston issue students' tickets to students under twenty-one years of age. Veterans regardless of age are eligible for reduced rates on most of the railroads. Applications for these may be obtained at a railroad office and must be presented at the school office for signature.

LIBRARY AND STUDY AREAS

THE UNIVERSITY LIBRARY is well equipped in technical literature and is available for use of students of the Institute. The reading rooms are open from 8:00 A.M. to 10:00 P.M. on weekdays, and from 8:30 A.M. to 4:00 P.M. on Saturdays. The privilege of obtaining books from the Boston Public Library is extended to students of the Institute. Applications for this privilege should be made directly to the Boston Public Library.

Adequate study areas are available in the Library and Student Center Building for student use.

TEXTBOOKS AND SUPPLIES

THE UNIVERSITY BOOKSTORE is operated for the convenience of the student body. All books and supplies which are required by the students for their work in the Institute may be purchased at the Bookstore, which is located in the basement of Richards Hall.

PLACEMENT SERVICE

It is the policy of the Institute to serve the students whenever possible by placing them in those positions which promise attractive opportunities for development and advancement. The Institute cannot guarantee to place its students, but it does endeavor to keep in close touch with those who desire placement service and to assist them in obtaining satisfactory advancements in positions and income. No charge is made for placement service. Those needing this assistance should arrange an appointment with the Director of Placement.

VISITORS

Visitors are always welcome at one class session in any department. Those who wish to visit any of the classes should call at the school office and obtain a visitor's card signed by the Dean.

REQUIREMENTS FOR ADMISSION

REGULAR STUDENTS

Applicants for admission who present evidence of completion of an approved secondary school course, or the equivalent of fifteen units (including one unit in Algebra and one in Plane Geometry), may be admitted as regular students, candidates for the Degree of Associate in Engineering or Associate in Science and also eligible to proceed later, if they so desire, to the Degree of Bachelor of Science offered by University College of Northeastern University.

CONDITIONED STUDENTS

Applicants for admission who do not meet the full requirements for admission as regular students may, at the discretion of the Committee on Admission, be admitted as conditioned students provided such secondary school work as has been completed embraces one unit of Algebra and one unit of Plane Geometry.

A conditioned student whose scholarship is satisfactory but who has not removed his conditions within the time specified by the Committee on Admission may be permitted to continue with his program of studies, but on the completion of the chosen four-year curriculum he will receive a diploma indicating the completion of the program, but not carrying the award of the Degree of Associate in Engineering or Associate in Science.

SPECIAL STUDENTS

Students who wish to register for a special program or for single courses may be admitted as special students, not candidates for the Degree, provided their previous education and training are the equivalent of the prerequisite requirements for the courses in which they wish to enroll.

Programs are planned to meet individual needs and should prove of benefit to those who wish rapid and immediate knowledge of certain fields, whether to supplement former training or to obtain preparation which will permit them to enter a new line of endeavor.

CLASSIFICATION OF STUDENTS

Students are admitted to Lincoln Institute in September, January or June. Applicants admitted without entrance deficiencies may complete the requirements for the Associate Degree in four academic years by attending three evenings per week.

All applicants admitted to the freshman class as degree candidates are required to take the Mathematics Placement Test which is given on the following dates:

- May 22, 1961 — for June (*Summer Term*) students
- September 11, 1961 — for September (*Division A*) students
- January 22, 1962 — for January (*Division B*) students

Those who demonstrate satisfactory proficiency in the test will proceed directly with the prescribed courses for the first year.

Inasmuch as success in the study of engineering is based upon a proficiency in Mathematics, those who receive a low score in the Placement Test (either because of inadequate preparatory courses or because of the length of time elapsed since graduation from secondary school) are classified as "Pre-Engineering Students" and must enroll for and satisfactorily complete a special comprehensive one-term course in Pre-Engineering Mathematics. Upon satisfactory completion of this course they are reclassified as degree candidates.

DIVISION A STUDENTS

Students starting in September who demonstrate satisfactory proficiency in the Mathematics Placement Test may, by attendance on three evenings per week, complete the prescribed courses for the freshman year in May. They may, however, elect a lighter scholastic load, thereby extending their programs of study.

Summer courses are not necessary for Division A students carrying the normal course load. However, those enrolled as candidates for the degree of Bachelor of Science may find it advantageous to complete certain of their management courses during the summer terms.

DIVISION B STUDENTS

Students starting in January and demonstrating satisfactory achievement in the Mathematics Placement Test may complete

two of the three freshman year courses by attending three evenings per week from January to the middle of July.

PRE-ENGINEERING STUDENTS

Students who demonstrate in the Mathematics Placement Test a need for review in Mathematics are classified as Pre-Engineering Students and must enroll for the course Pre-Engineering Mathematics. This course, consisting of Algebra and Plane Geometry, is available in each of the three terms starting in September, January or June.

During the Fall and Spring Terms the course meets on Tuesday and Friday evenings from 6:50-9:30 P.M. In the Summer Term it meets three evenings a week for the first six weeks and two evenings a week for the next eight weeks.

Students enrolling for Pre-Engineering Mathematics in September may also concurrently enroll in the course Engineering Drawing. Satisfactory completion of Pre-Engineering Mathematics would then permit them to enroll in January for the regular Engineering Mathematics course. By taking Physics in the Summer Term they would then be ready to start the Sophomore year in September. However, attendance during the summer is not obligatory.

Students enrolled for Pre-Engineering Mathematics in the January and Summer Terms can complete but this one course. This, however, will qualify them to continue in September as degree candidates in the full freshman program.

ADMINISTRATIVE REGULATIONS

APPLICATIONS FOR ADMISSION

Applications for admission should be filed as early as possible in order that the necessary investigations may be made and the status of each student definitely determined before the opening day.

STUDENTS ADMITTED WITH ADVANCED STANDING

Advanced Standing Credit may be granted for work completed in other approved colleges or institutions provided the courses taken were equivalent to those offered by the Lincoln Institute. It will be necessary for the applicant to obtain an official transcript of record together with a catalogue and present them to the Dean before any action can be taken. This should be done no later than one week before the opening of the semester.

REGISTRATION

Each student is required to present himself at the school office, and to have his course approved by the Dean or his assistants and to complete his registration.

Students should avoid late registrations since no one is permitted to join a class after the second session. *No deduction from tuition fees is made because of late enrollment.*

THE SCHOOL YEAR

The school year is divided into two semesters of sixteen weeks each. The first semester extends from September 18 to January 25, and the second semester from January 29 to May 24. The summer term extends from May 28 to August 30, 1962.

During the summer term Pre-Engineering Mathematics, Algebra, Trigonometry, Engineering Drawing I and II, Physics I and II, are the only courses offered.

SESSIONS

Classes meet on weekday evenings. There are no classes on Saturdays. A full schedule will include three evenings a week. All classes meet from 6:50 to 9:30 P.M.

ATTENDANCE REQUIREMENTS

Class rolls close after the second session. Therefore, a student must attend either the first or second class session to be eligible for admission to a course.

A careful record of attendance upon class exercises is kept for each student. Absence from regularly scheduled classes on any subject will seriously affect the standing of the student.

A minimum attendance record of 75 per cent must be maintained in each class before a student will be admitted to examination. Students will be dropped from the class roll when their absences exceed 25 per cent of the class sessions. A student dropped for this reason *cannot be reinstated and no refund of tuition* will be granted.

Students who are unavoidably absent from class may receive the homework assignments by telephoning the school office.

TESTS AND QUIZZES

Final examinations are required upon the completion of all courses. Tests are held throughout the term at the discretion of the instructors.

A student desiring to make up a missed test or quiz must obtain a petition form from the Institute office, complete the petition and pay the required fee of \$3.00 in the Bursar's office. The receipted original must then be filed in the Institute office and the student's copy countersigned.

Make-up tests will be given on a Saturday at 1:30 P.M. in a designated room.

Petitions must be filed in accordance with the schedule listed below. Following is a list of petition and make-up dates for the school year 1961-1962:

<i>For Test Missed in</i>	<i>Must File Petition by</i>	<i>Must Take Test on</i>
Sept. or Oct.	12:00 NOON, Saturday, Nov. 4	November 18
November	8:30 P.M., Monday, Dec. 4	December 16
December	8:30 P.M., Thursday, Jan. 4	January 13
February	12:00 NOON, Saturday, Mar. 3	March 17
March	12:00 NOON, Saturday, Apr. 7	April 21
April or May	12:00 NOON, Saturday, May 5	May 12

In the event that an absence is known in advance, a petition may be filed before the quiz is missed. *No petition will be accepted after the dates specified for ANY reason.*

Any student who does not take the make-up test as scheduled will lose this make-up privilege.

TRANSFERS

Students are not permitted to change from one course to another without first consulting the Dean and receiving a Transfer Order signed by him.

GRADING SYSTEM

The following system of grading is used:

- A — Superior Work
- B — Above Average Work
- C — Average Work
- D — Lowest Passing Grade
- Inc — Incomplete (Given only when final examination is missed)
- F — Failure

A grade of "F" is a definite failure and the student must repeat the course in its entirety. No special examination will be allowed.

MAKE-UP EXAMINATIONS

The following policies govern make-up of final examinations:

If a student is absent from a final examination, he will receive a grade of "Inc." He may then petition for a special make-up final examination. This is a privilege which may be granted by the Committee on Education and is dependent upon the quality of the work the student has done throughout the course. If granted, the examination must be taken prior to the next final examination period. Failure to remove the "Inc" will result in it being changed to an "F."

The fee for each make-up examination is \$5.00.

QUALITY POINTS

The method of figuring quality points is as follows:

Each semester course grade of "A" is multiplied by 4; each "B" is multiplied by 3; each "C" is multiplied by 2; each "D" is multiplied by 1; and each "F" or "Inc" is multiplied by 0.

If a course meets two evenings per week, the point value will be doubled. Then the total number of quality points divided by the total number of course nights completed shall be the quality point average.

A student must achieve a quality point average of 1.75 to graduate from the Institute.

REPORTS OF STANDING

A report of the student's standing is issued at the end of each semester. Grades are mailed to the students and will not be given out at the school office. Under no circumstances will grades be given over the telephone. In the case of students who are under twenty-one years of age, reports may be sent to parents in the event of unsatisfactory work on the part of the student, non-compliance with administrative regulations, continued absence, and withdrawal. Parents of minors may obtain reports at any time on request.

GRADUATION REQUIREMENTS

Students may register for single subjects or for complete courses provided such registration meets with the approval of the Dean; but to receive the Degree of Associate in Engineering or Associate in Science, the student must fulfill the following conditions:

- a. He must complete all the courses of his particular curriculum, either by attendance at this Institute, or by receiving advanced standing credit for those courses, or the equivalent of those courses, as determined by the Dean.
- b. The various curricula have been arranged so that the courses can be completed in four years. An extension of time will be granted to those who wish to take longer to meet the requirements for graduation; however, the entire program must be completed in eight years.
- c. Regardless of the advanced standing credit he receives, he must have been in attendance for at least a year preceding the date on which he expects to graduate; that is, he must complete at least one full year's work in the Lincoln Institute.
- d. He must have achieved a quality point average of at least 1.75 in the courses taken in the Institute. Courses for which a student has been awarded Advanced Standing Credit will not be counted in determining a student's scholastic average.
- e. Upon graduation, honors will be conferred based upon the following quality point averages:
3.0 — Honor 3.5 — High Honor 3.75 — Highest Honor
In order to be eligible for honor graduation, a student must have completed at least two full years of work in the Lincoln Institute.

ATTENDANCE AT COMMENCEMENT

All candidates for a first degree (bachelor or associate) are required to attend Commencement in the year of qualification. First degrees in absentia are awarded only to candidates excused for personal or immediate-family illness, military service, or employment obligations beyond the control of the candidate.

A petition to receive a degree in absentia must be presented to the dean of the school or college in which the candidate qualifies. Each petition will be acted upon by the academic dean involved.

ACADEMIC STANDARDS

It is expected that the students will at all times endeavor to achieve a high record of attainment. The Committee on Education reserves the right to review all students' records and deny re-admission to those students who fall below a minimum quality requirement. This requirement has been established as follows:

In order to be allowed to remain in the Institute, a student must have achieved a quality point average of 1.2 at the completion of 18 semester hours, 1.4 at the completion of 36 semester hours, and 1.6 at the completion of 54 semester hours. It should be further noted that a student who accumulates more than 18 semester hours of failures will not be eligible to continue in the Institute.

METHODS OF INSTRUCTION

Instruction is given by means of lectures, recitations, laboratory work and practical work in the drawing rooms. Great value is set upon the educational effect of these exercises, which constitute the foundation of each of the courses. Oral and written examinations are held at the discretion of the instructors.

The attention of every student is drawn to the fact that home assignments must be dutifully done and written work submitted as assigned if the student's grade is not to be seriously affected. Willful disregard of this matter will result in disciplinary action by the Administrative Officers.

SUBJECTS OF INSTRUCTION

On pages 59 to 74 will be found a detailed statement of the scope of the subjects offered in the various courses. The subjects are numbered for convenience of reference in consulting the various curriculum schedules.

Required courses, and those prerequisite thereto, must have been successfully pursued before any advanced course may be taken.

TUITION AND OTHER FEES

MATRICULATION FEE

A matriculation fee of \$10.00 must accompany the initial application for admission to the Institute. This fee is not refundable.

TUITION

Tuition fees are based on a charge of \$17.50 a semester hour. The tuition fee, therefore, is \$52.50 for a 3 semester hour course and \$105.00 for a 6 semester hour course. The charge for Pre-Engineering Mathematics is \$105.00.

A student who is carrying a normal load of three evenings per week would have a tuition charge of \$157.50 per semester.

Tuition is charged on a semester basis payable at the beginning of each semester. As a convenience to students, at their request and without additional charge, the Student Accounts Office will allow this bill to be paid in two payments.

LATE PAYMENT FEE

Payments are due by Saturday of the week in which the bill is dated. If payment is not made, or a deferred payment agreement arranged, by that date, a late fee of \$2.00 is charged.

DEFERRED PAYMENT PRIVILEGE

Occasionally situations develop—usually beyond the control of the student—which make it difficult to meet the payments in the manner outlined above. Under such circumstances the student is advised to discuss his problem personally with the Student Accounts Office where a convenient deferred payment agreement can be worked out. A service fee of \$2.00 is charged for this privilege.

LATE REGISTRATION FEE

Students are urged to register well in advance of the official opening of the semester, since any student who registers after Saturday of the opening week of the School term is charged a Late Registration Fee of \$5.00.

CHEMISTRY FEE

All students taking Chemistry are charged a Chemistry laboratory deposit of \$15.00, payable in September. Those students

taking Organic Chemistry are required to make an additional deposit of \$10.00 at the beginning of the second semester.

The unused portion of the deposit will be refunded after deductions are made for breakages, chemicals, supplies and non-returnables.

SPECIAL EXAMINATION FEES

The fee for each special examination for conditioned students, or for students who have for justifiable cause omitted to take the regular scheduled final examinations, is \$5.00. The fee must be paid when the petition is filed.

The fee for each special test or quiz missed during the month is \$3.00 which must be paid when the petition is filed.

GRADUATION FEE

On completing the curricular requirements for the Degree of Associate in Engineering or Science, the student will pay a graduation fee of \$20.00. This fee must be paid by May 1 in the year of the student's graduation.

BOOKS AND SUPPLIES

Students purchase their own textbooks and work materials. The cost varies according to the subject for which the student is enrolled. The average cost for a normal program of three subjects is about \$25.00. Textbooks for a single course range from \$4.00 to \$15.00.

Students taking Engineering Drawing should be prepared to expend a sum of approximately \$18.00 for drawing supplies and \$22.00 for a set of drawing instruments in addition to the textbooks which cost approximately \$9.50.

REFUND OF TUITION

The University provides all instruction and accommodations on an academic semester basis; therefore, no refunds are granted except in cases where students are compelled to withdraw on account of personal illness or other reasons beyond their control. In no event will a refund be made if the individual's attendance is recorded beyond the fifth class session. A student must complete an official withdrawal application before being considered for refund. Questions regarding refunds should be discussed with the Bursar's Office.

PROGRAMS OF INSTRUCTION

The Lincoln Institute offers evening programs of study leading to the degree of Associate in Engineering in the major fields of Civil, Mechanical, Electrical and Electronic Engineering Technology, and the degree of Associate in Science in the field of Chemistry.

The courses of study are of college grade and cover much of the technological subject matter customarily included in schools of engineering but the curricula are less extensive in scope than those required for the baccalaureate degree in engineering. They prepare students to work with professional engineers in various technical capacities.

Students normally attend on a schedule of three evenings a week for four years. In those cases where students are unable to carry all of the work prescribed in any year, the Dean will grant an extension and determine the order in which courses shall be taken to satisfy prerequisite requirements.

The credits earned in the Associate Degree programs can be used to satisfy the engineering requirements for the Degree of Bachelor of Science which is offered in conjunction with University College of Northeastern University.

CHEMISTRY

Leading to the Degree of Associate in Science

The Science of Chemistry has undergone a marked development in recent years. It has grown out of the discoveries of the chemical laboratories which have launched many new industries whose production processes involve chemical as well as physical change. The chemist is in demand and his aid is sought in the operation of plants producing drugs, oils, rayon and cellophane, plastics and various synthetic products resulting from intensive research during the war. The chemist may assist in the creation of more economical manufacturing processes, promote the development of manufacturing by-products, and be instrumental in the discovery of new products in the research laboratories.

In addition to the fundamental courses in chemistry, mathematics, and physics, a considerable amount of time is devoted to more advanced work in chemistry. Since the field is so varied, the curriculum has been designed to give students a broad training rather than a specialized training in one specific industry.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Pre-Engineering Mathematics Course. (700)

FIRST YEAR					
First Semester			Second Semester		
Course No.	Course	Semester Hours	Course No.	Course	Semester Hours
701	Algebra	3	702	Trigonometry	3
601	Engineering Drawing I	3	602	Engineering Drawing II	3
801	Physics I	3	802	Physics II	3
		9			9

SECOND YEAR					
703	Analytical Geometry and Differential Calculus	3	704	Integral Calculus	3
101	General Chemistry I	3	102	General Chemistry II	3
151	General Chem. Lab. I	3	152	General Chem. Lab. II	3
		9			9

THIRD YEAR					
103	Qualitative Chemistry	3	104	Quantitative Chemistry	3
153	Qualitative Analysis Lab. ..	3	154	Quantitative Analysis Lab. ..	3
501	Applied Mechanics I	3	502	Applied Mechanics II	3
		9			9

FOURTH YEAR					
107	Physical Chemistry I	3	108	Physical Chemistry II	3
105	Organic Chemistry I	3	106	Organic Chemistry II	3
155	Organic Chem. Lab. I	3	156	Organic Chem. Lab. II	3
		9			9

CIVIL ENGINEERING TECHNOLOGY

Leading to the Degree of Associate in Engineering

The field of Civil Engineering has to do with the planning and building of all kinds of structures and public works. Today its major branches include topographical, municipal, railroad, highway, structural, hydraulic, and sanitary engineering. It covers land surveying, the building of railroads, soil mechanics, harbors, docks, the construction of sewers, water works, streets and highways, the design and construction of flood control projects, bridges, buildings, walls, foundations, and all fixed structures.

This curriculum is designed to offer the relatively compact body of principles upon which much of the work of Civil Engineering depends. It is intended to prepare young men to assist in the work of design and construction of structures, to assist in solving the problems of water supply, and to undertake intelligently the supervision of work in allied fields of engineering and general contracting.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Pre-Engineering Mathematics Course. (700)

FIRST YEAR					
First Semester			Second Semester		
Course No.	Course	Semester Hours	Course No.	Course	Semester Hours
701	Algebra	3	702	Trigonometry	3
601	Engineering Drawing I	3	602	Engineering Drawing II	3
801	Physics I	3	802	Physics II	3
		9			9

SECOND YEAR					
703	Analytical Geometry and Differential Calculus	3	704	Integral Calculus	3
201	Surveying I	3	202	Surveying II	3
501	Applied Mechanics I	3	502	Applied Mechanics II	3
		9			9

THIRD YEAR					
203	Transportation Engineering	3	204	Hydraulics	3
503	Strength of Materials I	3	504	Strength of Materials II	3
213	Structural Drawing I	3	214	Structural Drawing II	3
		9			9

FOURTH YEAR					
207	Concrete Design I	3	208	Concrete Design II	3
205	Structural Analysis I	3	206	Structural Analysis II	3
†209	Structural Design I	3	†210	Structural Design II	3
†211	Water Supply	3	†212	Sewerage and Sewage Dis- posal	3
		9			9

† Students elect one of these two courses.

ELECTRICAL ENGINEERING TECHNOLOGY

Leading to the Degree of Associate in Engineering

The Electrical Engineering profession affords a wide diversification of employment opportunities. The Electrical industry and the general field of Electrical Engineering are generally divided into two main branches, one having to do with electrical power and the other, electronics and communications. The power group deals principally with larger equipment and apparatus employing heavy currents; the communications group involves more delicate equipment with smaller current values. Electrical Engineering thus includes the generation, transmission and distribution of electrical energy for light and power purposes, the application of d-c and a-c machinery to industry, and the operation of all types of electrical equipment, including communications, radio and electronic apparatus.

This course of study provides a good theoretical background with practical applications. Instruction is carefully planned and the time is divided among lecture, laboratory testing, homework and reports.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Pre-Engineering Mathematics Course. (700)

FIRST YEAR

First Semester			Second Semester		
Course No.	Course	Semester Hours	Course No.	Course	Semester Hours
701	Algebra	3	702	Trigonometry	3
601	Engineering Drawing I	3	602	Engineering Drawing II	3
801	Physics I	3	802	Physics II	3
		9			9

SECOND YEAR

703	Analytical Geometry and Differential Calculus	3	704	Integral Calculus	3
301	D-c Circuit Theory	3	302	A-c Circuit Theory	3
501	Applied Mechanics I	3	502	Applied Mechanics II	3
		9			9

THIRD YEAR

303	D-c Machinery	3	304	A-c Machinery	3
353	D-c Machinery Lab.	3	354	A-c Machinery Lab.	3
503	Strength of Materials I	3	504	Strength of Materials II	3
		9			9

FOURTH YEAR

355	Electronics for Industry Lab. I	3	356	Electronics for Industry Lab. II	3
305	Electronics for Industry	3	306	Transmission-Line Theory	3
505	Heat Engineering I	3	506	Heat Engineering II	3
		9			9

ELECTRONIC ENGINEERING TECHNOLOGY

Leading to the Degree of Associate in Engineering

This course is designed to train students for the various branches of the field of Electronics. The new advancements in the fields of radio, television, radar and sonar created by the urgencies of war have opened up greater opportunities for intellectual pioneering in these fields of engineering than in other branches of the profession.

Since electron tubes and circuits function around the principles of Electricity, this subject is adequately treated in the second year of the course. After a thorough study of the various types of electron tubes and their basic circuits in the third year; the fourth year is devoted to the various important fields that the student may wish to enter, such as Communications, Microwaves and Radar, and the new fields of Transistors and Tele-metering.

The whole course is a good balance between theory and practice, and experiments involving electron tubes, transistors and their applications are used through the last three semesters of the course. Laboratory reports and homework problems are used to supplement the experiments and lectures so that the student will absorb the material in a thorough manner.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Pre-Engineering Mathematics Course. (700)

FIRST YEAR					
First Semester			Second Semester		
Course No.	Course	Semester Hours	Course No.	Course	Semester Hours
701	Algebra	3	702	Trigonometry	3
601	Engineering Drawing I	3	602	Engineering Drawing II	3
801	Physics I	3	802	Physics II	3
		9			9
SECOND YEAR					
703	Analytical Geometry and		704	Integral Calculus	3
	Differential Calculus	3	302	A-c Circuit Theory	3
301	D-c Circuit Theory	3	402	Semiconductors and	
401	Wave Propagation	3		Transistors	3
		9			9
THIRD YEAR					
**105	Electron Tubes and		**406	Electron Tubes and	
	Circuits I	6		Circuits II	6
403	Electrical Measurements...	3	456	Electronic Lab.	3
		9			9
FOURTH YEAR					
**107	Communication		**108	Communication	
	Engineering I	6		Engineering II	6
457	Advanced Electronic		458	Advanced Electronic	
	Lab. I	3		Lab. II	3
		9			9

** Two nights per week.

MECHANICAL ENGINEERING TECHNOLOGY

Leading to the Degree of Associate in Engineering

The field of mechanical engineering is concerned with the harnessing of our power resources by means of machinery to perform useful work. In contrast to civil engineering which deals primarily with static forces, mechanical engineering is more concerned with the mechanics of motion or kinetics. And because moving parts require constant care and adjustment, there is the task not only of designing and installing complicated machinery, but also of operating it efficiently after it has been installed.

Among the major branches of mechanical engineering are included power, production engineering, machine and machine-tool design, railway mechanical engineering, automotive engineering, aeronautical engineering, refrigerating engineering, air conditioning engineering, and the numerous mechanical problems related to modern industrial operation.

This program of study is designed to give the student considerable training in the principles of mechanical engineering technology and equip him for advancement in the many sub-divisions of this branch of engineering.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Pre-Engineering Mathematics Course. (700)

FIRST YEAR					
First Semester			Second Semester		
Course No.	Course	Semester Hours	Course No.	Course	Semester Hours
701	Algebra	3	702	Trigonometry	3
601	Engineering Drawing I	3	602	Engineering Drawing II	3
801	Physics I	3	802	Physics II	3
		9			9

SECOND YEAR					
703	Analytical Geometry and Differential Calculus	3	704	Integral Calculus	3
603	Machine Drawing I	3	604	Machine Drawing II	3
501	Applied Mechanics I	3	502	Applied Mechanics II	3
		9			9

THIRD YEAR					
507	Mechanism	3	201	Hydraulics	3
503	Strength of Materials I	3	504	Strength of Materials II	3
505	Heat Engineering I	3	506	Heat Engineering II	3
		9			9

FOURTH YEAR					
508	Machine Design I	3	509	Machine Design II	3
551	Mechanical Engineering Laboratory I	3	552	Mechanical Engineering Laboratory II	3
**	Engineering Elective	3	**	Engineering Elective	3
		9			9

**The electives available are Concrete Design, Dc-Ac Circuit Theory, General Chemistry Lecture, Structural Analysis, Structural Drawing, Surveying.

INDUSTRIAL ENGINEERING TECHNOLOGY

Students who are interested in pursuing a program in Industrial Engineering Technology should enroll for the Associate Degree in Mechanical Engineering Technology.

Upon completion of this program they should then enroll in University College for the Industrial Technology program.

Satisfactory completion of these two phases will allow a student to qualify for the Degree of Bachelor of Science.

CONTROL SYSTEMS ENGINEERING TECHNOLOGY

The rapid technological advances of the space age bring a need for the specialist to keep his own technical development abreast of the changes. Attuned to this need is the special sequence of courses offered by Lincoln Institute for technical personnel engaged in research and development related to control systems. Here the complex technology of engineering systems is effectively analyzed through basic foundation courses for the man wishing to advance his professional growth in either of two specific areas:

Control Systems

Control Devices

Admission qualifications include the Associate Degree in Electrical or Electronic Engineering or its equivalent in education or experience. Graduates out of college ten or more years will also find the program helpful for up-grading in current developments.

Each course carries four units of credit per year. A certificate is awarded upon satisfactory completion of sixteen units of credit selected from among courses listed below:

Transients in Linear Systems	Statistical Inferences
Pulse Circuits	Probability Theory
Transistor Circuit Engineering	Operations Research
Radar Engineering	Microwave Theory
Analog and Digital Computers	Communications Theory
Servomechanisms	

A unit equals one hour of instruction per week for a sixteen week semester. Tuition for these courses is charged at the rate of \$30.00 per unit.

Those interested in this program are urged to contact the school office and request a special brochure describing the program in full detail.

ENGINEERING AND MANAGEMENT
Leading to the Degree of Bachelor of Science

The Engineering and Management curriculum combines the fundamental courses in one of the several areas of engineering with an integrated program in management, the humanities and the social sciences to provide a broad background of training for those who aspire to positions of managerial responsibility where technical knowledge is required.

The curriculum is offered by University College in conjunction with the Lincoln Institute, one of the affiliated schools of Northeastern University. The engineering requirements may be earned by satisfactory completion of equivalent courses in an accredited engineering college.

The total credit requirements for the degree are 130 semester hours distributed as follows:

		<i>Semester Hours</i>
Engineering Credits applicable from Associate Degree		60
Management Courses — Required Core		
English	4	Labor-Management Relations 2
Economics	4	Managerial Accounting 4
Finance I	2	Statistics 2
Industrial Management	4	Managerial Statistics 2
Law for Engineers	2	Psych. for Bus. & Ind. I 2
		28
Liberal Arts — Required		24
LA1-2 Man and the Physical Universe		LA5-6 Man's Cultural Inheritance
LA3-4 Man in Society		LA7-8 Man and Values
Management Courses — Electives		
(chosen from one of the options listed below)		18
Total semester hours required for degree		130

		OPTIONS	
Production	<i>Semester Hours</i>	Technical Sales	<i>Semester Hours</i>
Work Simplification I	2	Government Controls	2½
Work Measurements I	2	Distribution, Prin.	4
Production Processes	2½	Purchasing	2½
Material Handling	5	Salesmanship	2½
Production Plan. & Control	4	Sales Management	2½
Quality Control	2½	Sales Promotion	2½
Plant Layout	5	Transportation Practices	2½
Managerial Economics	2½	Office Management Practices	2½
Manufacturing Mgmt.	2½	Business Org. & Adm.	2½
Materials Mgmt.	2½	Credit Fundamentals	2½
Human Relations	5	Human Relations	5
Business Org. & Admin.	2½	Finance II	2
Finance II	2		
		Administrative	
Government Controls	2½	Business Org. & Admin.	2½
Human Relations	5	Distribution, Prin.	4
Insurance for Mgmt.	2½	Purchasing	2½
Labor Agreements	2½	Credit Fundamentals	2½
Labor Legislation	2½	Electronic Data Processes	2½
Managerial Economics	2½	Adv. Data Proc.-Programming	2½
Office Management Practices	2½		

Courses other than those shown above may be taken upon approval of the Dean if they are consistent with the student's educational pattern.

ENGINEERING LABORATORY EQUIPMENT

The Lincoln Institute has available for its use all of the laboratory facilities of the College of Engineering. These include the following:

CIVIL ENGINEERING LABORATORIES

A considerable amount of demonstration equipment including many models is available for use in the study of structures, hydraulics, sanitary engineering, highways, concrete and soil mechanics.

Surveying

The Department of Civil Engineering is provided with a variety of excellent and up-to-date equipment for field work. The instruments have been chosen to make possible the working out of advanced as well as elementary field problems, and to acquaint the students with the principal makes and types of instruments in general use including several calculating machines and a Geodimeter.

Hydraulics, Sanitary, and Bacteriological Engineering

These laboratories, located on the basement and first floors of the Botolph Building, are equipped with demonstration measuring devices for use in connection with the courses in hydraulics.

Complete equipment is also provided for studies of water softening, filtration, coagulation, analysis of water and sewage by the photometer, and analysis of bacterial condition of water and sewage. Specialized equipment for advanced courses in sanitary research is also available.

Highway Materials

(Cement, Concrete, Soils, and Asphalt)

Located on the first floor of the Botolph Building, this modern, temperature-humidity-controlled laboratory is equipped for conducting all the routine tests on cement, aggregate and concrete. Considerable equipment is available for conducting research work.

Equipment is also available for conducting a major portion of the accepted tests on bituminous materials and aggregates as used

in highway work as well as Marshall Stability Unit for bituminous concrete. Soil Mechanics equipment consists of a general soil sampler, wet-mechanical grain-size analysis, Tri-axial Test equipment, Permeability, OMC unit, CBR equipment, two Tri-axial units and four Consolidation loading frames, and a Hydraulic Consolidometer.

Aerial Photogrammetry

The apparatus in this laboratory may be used to instruct the students in the basic principles of photogrammetry, or may be used to instruct the students in the more technical phases of photogrammetry such as horizontal control, vertical control, stereoscopic plotting, mechanical triangulation, and the tri-metrogon method of plotting.

CHEMICAL LABORATORIES

For experiments and investigations in Chemistry there are available three laboratories with the following equipment:

Analytical Chemistry

The laboratory for Analytical Chemistry is fully equipped for giving instruction in the usual undergraduate courses. Each student is supplied with the necessary laboratory glassware, porcelain, and the standard pieces of hardware. Special equipment of all needed types is available.

This laboratory is equipped with high pressure steam, vacuum, and the facilities usually found in an analytical laboratory. The various instruments and other chemical equipment necessary for the examination, testing, and analysis of the raw materials, intermediate and final products of the various industries are at hand.

The electrical equipment includes a Kinley electro-analysis machine for the determination of copper, lead, nickel, and zinc; a Hevi-duty electric furnace for use in ignition and combustion work; and a Freas drying oven capable of adjustment for various temperatures. Power is available in a variety of d-c and a-c voltages.

An adjoining balance room is equipped with balances suitable for quantitative analytical work.

Inorganic Chemistry

In the locker assigned to each student for his individual use are the articles needed more or less continually by him as he does his experiments in the laboratory sessions. He has a liberal supply of glass, porcelain, metal and other articles. Additional pieces of apparatus are issued from the stockroom or otherwise made available for use in particular experiments where they are needed.

The laboratories are equipped with general facilities appropriate to this course, such as gas, electricity, cold and hot water, fume hoods.

Organic Chemistry

The needed equipment is available. There are individual lockers and apparatus, fume hoods for general use, and special equipment, as required.

Drying operations are carried out with the aid of a steam-heated drying chamber and electrically heated drying oven. Steam lines on the benches supply the steam for steam distillations, eliminating the necessity of individual steam generators.

ELECTRICAL ENGINEERING LABORATORIES

The Electrical Engineering laboratories are located in Hayden Hall. Three laboratories are included in this unit: Dynamo; Industrial Electronics and Control; and Communications Laboratories.

Dynamo

This laboratory is provided with both 60 cycle per second three-phase, 230-volt alternating-current and 115/230-volt three-wire direct-current sources. The equipment includes more than sixty motors and generators of different types together with the necessary auxiliary equipment to operate and test them. The motors and generators have been selected so as to reduce as much as possible the risk from high voltage while making available to the students a representative range of commercial apparatus.

Industrial Electronics and Control Laboratory

This laboratory is designed to offer experiments in the application of electronic tubes and circuits to industry. In addition to basic electronic-control circuits, there are larger pieces of equip-

ment, including the control of d-c generator voltage, d-c motor speed control, thyatron and ignitron rectifiers, electronic synchronization of a-c sources, and induction heating, as well as servo-mechanism devices and systems.

Communications Laboratory

This laboratory is equipped with apparatus to demonstrate and test the many ramifications of electronic equipment used in low, audio, radio-frequency and high-frequency circuits. Available are many electronic instruments, including vacuum-tube voltmeters, cathode-ray oscilloscopes, audio and radio-frequency oscillators, wave-analyzers, pulse-generators and equipment operating at radar frequencies, as well as many other types used in telephone, radio, and television communication circuits; included also is equipment planned for teaching the principles of electrical measurements and calibrations.

ELECTRONIC ENGINEERING LABORATORIES

The Electronics laboratories are located in the Forsyth Building and Hayden Hall.

Electron Tubes and Circuits

Equipment is available to study the operating of all types of electron tubes that are normally used, extending from diodes through to beam tubes, gas triodes, photocells, cathode ray tubes, transistors, and the various rectifier, amplifier and other basic circuits used with them, including vacuum tube voltmeters, impedance bridge, regulated power supplies, resistance coupled amplifiers, inverse feedback amplifiers, wide band oscilloscopes, audio generators and lecher wire.

Communication Engineering

Equipment available for this course includes crystal oscillators, audio and radio oscillators, narrow and wide band and power radio frequency amplifiers, frequency doublers, plate and grid modulation units, single side band generators, radio frequency transmission lines, push-pull audio amplifiers, Q-meters, inter-modulation meter and transistor circuits. The frequency modulation apparatus includes balanced modulators, reactance modulators, phase modulators, discriminators, panoramic adapters,

limiters, and networks. The RCA dynamic demonstrator, plus detector, and IF amplifier units are used for receiver experiments.

Apparatus for television and radar circuitry includes sweep oscillators and amplifiers, pulse and square wave generators, video amplifiers, pulse forming and delay lines, multivibrators, counters, clipping, shaping. New equipment includes the latest wave analyzers, driven sweep oscilloscopes, and polaroid oscilloscope camera. The RCA dynamic demonstrator is used for complete TV receiver studies. Apparatus for wave guides, frequency counters, analog computers and slotted lines is also available.

To keep up with the expanding field of Electronics, both equipment and experiments are added and modified each year.

INDUSTRIAL ENGINEERING LABORATORY

The Industrial Engineering Laboratory is located in the Forsyth Building and is devoted exclusively to methods engineering and time study analysis. This laboratory is completely equipped with the latest facilities and tools used by industrial engineers. Besides the general equipment consisting of benches, tables, lathes, jigs, fixtures, and racks, the laboratory has an ample supply of time study boards, stop watches and timers for time study work. There is also available complete motion picture equipment and microchronometers for micromotion work.

Students in the Department of Industrial Engineering also share in the use of the Mechanical Engineering Laboratories.

MECHANICAL ENGINEERING LABORATORIES

The Mechanical Engineering Department has a well-equipped laboratory, containing a large variety of modern machines and occupying over 10,000 square feet of floor space in the basement of Richards Hall, as well as about the same area in the basement of the Forsyth Building. Special areas have been set aside and equipped for oil testing, mechanics research, and similar purposes. Auxiliary equipment is, of course, available for making all the usual tests and measurements.

Steam Power

This equipment includes a wide variety of steam engines, turbines, pumps, heat exchangers, and measuring instruments.

Testing Materials and Heat Treatment

For tension, compression, bending, and shearing tests, the laboratory is equipped with a 300,000 lb. capacity Riehle, a 200,000 lb. and a 50,000 lb. capacity Olsen, as well as several smaller testing machines. For other tests the laboratory has torsional testing machines, impact testers, fatigue testers, hardness testers, extensometers, oil testing equipment, calorimeters, as well as instruments for measuring speed, vibration, temperatures, pressures and flow of fluids.

For heat treatment studies, electric furnaces, vacuum furnace and a gas-fired furnace are available. Equipment magnifying up to 2600 diameters is available for photographing crystalline structures, and the laboratory has polaroid equipment for photoelastic stress analysis.

X-ray equipment is available for examining metals.

Machine Shop

Adjoining the laboratory is a machine shop fully equipped with machine tools and welding equipment.

Internal Combustion, Aeronautics, and Miscellaneous

The internal combustion equipment includes a number of gas and oil, automobile, airplane, and Diesel engines. Most of these are set up for running experimental tests, but several are available for dismantling and demonstration purposes.

An open circuit Venturi type wind tunnel having a three-foot throat and capable of 120 miles per hour wind velocity is available for experimental and demonstration work in the measurement of air forces on model planes and other structures.

In addition to the above equipment, there is an oil-fired steam boiler, unit heater, air conditioning units, centrifugal fan and several weirs for measuring water flow.

Metallography tests with microscopes and photographic apparatus may be performed.

A Rover gas turbine has recently been installed for testing purposes.

DESIGN AND DRAFTING ROOMS

The School possesses large, light, and well-equipped drawing rooms for the carrying on of the designing and drafting which form so important a part of engineering work. These rooms are supplied with individual drawing tables and stools. Drafting room blackboards are equipped with traveling straightedge devices which facilitate speed and accuracy in blackboard demonstrations.

PHYSICS DEPARTMENT

Two large amphitheater lecture rooms, located in the Graduate Center Building, are provided with motion picture facilities, a public address system, a projection galvanometer, and a demonstration table equipped with water, compressed air, exhaust and both a-c and d-c electrical outlets.

The equipment which is used for illustrating the fundamental principles of physics has been carefully selected and adapted especially for lecture demonstrations. The following is a partial list of the available apparatus that supplements the usual equipment for this purpose: Hartl optical disk; eight-foot slide rule; vacuum pumps; calorimeters; optical benches with associated equipment; large demonstration cathode-ray oscilloscope; spectroscopes; projection apparatus; Van de Graaff electrostatic generator; sound and wave apparatus.

DESCRIPTION OF COURSES

THE LINCOLN INSTITUTE reserves the right to withdraw, modify, or add to the courses offered or to change the order or content of courses in any curriculum.

The Lincoln Institute further reserves the right to change the requirements for graduation, tuition and fees charged, and other regulations. However, no change in tuition and fees at any time shall become effective until the school year following that in which it is announced.

Any changes which may be made from time to time pursuant to the above policy shall be applicable to all students in the school, college, or department concerned, including former students who may re-enroll.

CHEMISTRY

101 General Chemistry I

This course will instruct in the fundamental ideas of matter and energy; properties of gases, liquids, and solids; molecular and atomic weights; theory of valence; classification of the elements; chemistry of metals and non-metals; the solution of all types of problems to illustrate practical applications.

(Prerequisite, 701, 702, 801, 802)

3 semester hours credit

102 General Chemistry II

A continuation of General Chemistry I; ionic reactions; electrochemistry; introduction to organic chemistry including industrial applications to petroleum, rubber, synthetic resins, plastics; chemotherapy; introduction to qualitative analysis.

(Prerequisite, 101)

3 semester hours credit

103 Qualitative Chemistry

The object of this course is not only to give instruction in analytical procedure and technique, but also to give the student a knowledge of the application of the fundamental concepts of solutions to the laboratory work. A portion of the time is devoted to the formulation of numerical terms which are essential to the understanding of the mass action law, ionic equilibria, solubility product, hydrolysis, and redox constants.

(Prerequisite, 101, 102)

3 semester hours credit

104 Quantitative Chemistry

It is the purpose of this course to give to the student a realization of the scientific development of quantitative methods. Each of the major operations such as weighing, measurement of volumes, titration, filtration, ig-

nition, and combustion, is considered from the standpoint of the theoretical principles involved, and with due consideration of the manipulative technique necessary.

This is followed by the combination of these operations and their application to actual analysis, including a comprehensive study of volumetric methods and of the more elementary parts of gravimetric analysis.

As the correct calculation of analytical results is of no less importance than the actual procedures of analysis, a number of problems form a very important part of the course.

(Prerequisite, 103)

3 semester hours credit

105 Organic Chemistry I

This course presents the general principles of structure, nomenclature, preparation, uses and reactions of the most important types of aliphatic carbon compounds. The topics in order are: Petroleum and coal products, halogen compounds, alcohols, ethers, aldehydes and ketones, carboxylic acids and derivatives, and carbohydrates.

(Prerequisite, 101, 102)

3 semester hours credit

106 Organic Chemistry II

A continuation of Organic Chemistry I. Topics included are: Aromatic hydrocarbons, phenols, halogen derivatives, nitrogen compounds, dyes, sulfur compounds, polyfunctional compounds, stereoisomerism, natural and synthetic polymers, alicyclic and heterocyclic compounds.

(Prerequisite, 105)

3 semester hours credit

107 Physical Chemistry I

This lecture course covers the fundamentals of physical chemistry. The topics discussed include: The three states of matter, the solution laws, kinetics, surface phenomena and colloids, thermochemistry, and chemical equilibrium.

(Prerequisite, 104, 704)

3 semester hours credit

108 Physical Chemistry II

This course continues lecture course Physical Chemistry I and includes the topics: Ionic equilibrium, electrochemical cells and electrolysis, kinetics of chemical reactions, atomic and molecular structure, and radioactivity. Practical applications of these fundamentals are discussed whenever possible.

(Prerequisite, 107)

3 semester hours credit

151 General Chemistry Laboratory I

This course consists of a series of laboratory experiments operated in conformance with the lecture course in General Chemistry I.

(Prerequisite, 101 or concurrently)

3 semester hours credit

152 General Chemistry Laboratory II

This course consists of a series of laboratory experiments operated in conformance with the lecture course in General Chemistry II.

(Prerequisite, 151, 102 or concurrently) 3 semester hours credit

153 Qualitative Analysis Laboratory

This course applies the material covered in Qualitative Chemistry to actual problems. After some preliminary experiments, certain procedures are combined and the separations and identifications made on both known and unknown solutions. Finally, these are combined into a comprehensive system of analysis which is applied to artificially prepared mixtures and industrial materials. Careful manipulations, thoroughness in observation, and accuracy in arriving at conclusions are expected of each student.

(Prerequisite, 151, 152, 103 or concurrently) 3 semester hours credit

154 Quantitative Analysis Laboratory

This is a laboratory course intended to illustrate by actual use the various analytical methods considered in Quantitative Chemistry. After certain preliminary experiments designed to acquaint the student with the apparatus used, volumetric analysis, including acidimetry and alkalimetry, oxidation, reduction, and precipitation methods are taken up. This is followed by simple gravimetric analyses.

(Prerequisite, 153, 104 or concurrently) 3 semester hours credit

155 Organic Chemistry Laboratory I

This course is co-ordinated with the lecture course Organic Chemistry I and deals with the preparation and reactions of the aliphatic compounds.

(Prerequisite, 105 or concurrently) 3 semester hours credit

156 Organic Chemistry Laboratory II

This course is co-ordinated with the lecture course Organic Chemistry II and deals with the preparation and reactions of the aromatic compounds.

(Prerequisite, 155, 106 or concurrently) 3 semester hours credit

CIVIL ENGINEERING TECHNOLOGY**201 Surveying I**

A course of lectures which treats the basic principles, such as taping, compass, theory and use of the transit as applied to both random and closed traverses, differential leveling, profile leveling, and double-rodged leveling. The D.M.D. and Rectangular Co-ordinate methods of computing, plotting and running traverses are stressed and especially as they may apply to such work or procedure as outlined by the Massachusetts Land Court.

The theory and use of the plane table, including the intersection, resection, and three point problem is also studied.

(Prerequisite, 702) 3 semester hours credit

202 Surveying II

A course of lectures and problems on simple curves (railroad curves and circular arcs), vertical curves, compound curves and Stadia surveying. The method of obtaining cross-sectional areas is taught. The student is instructed in the preparation of earthwork tables and the solution of the Mass diagram.

(Prerequisite, 201)

3 semester hours credit

203 Transportation Engineering

This course consists principally of a discussion of modern highway engineering practices. The general features of routing, such as horizontal and vertical curves, rates of grade, superelevation, and traffic control are studied both from the viewpoint of safety and economics. Materials and tests of materials used in the construction of both highway and airport projects are discussed, including drainage problems and frost-action in subgrades. The major portion of the course is spent on the construction procedure of the several types of roadways. These consist of the low-cost types such as stabilized soils, gravel, and crushed stone. The higher-cost types of roadways such as Penetrated Macadam, Portland cement concrete, brick pavements, and Asphaltic Concrete are included. A brief discussion of airport design and layout concludes the course.

The application of the latest research development is considered throughout the entire course.

(Prerequisite, 202)

3 semester hours credit

204 Hydraulics

This course is a study of the principles of both hydrostatics and hydrodynamics. The subjects considered are the pressure on submerged areas together with their points of application; the laws governing the flow of fluids through orifices, short tubes, nozzles, weirs, pipe lines, pipe net works, and open channels; Reynolds numbers; and viscosity.

(Prerequisite, 501, 502, 704)

3 semester hours credit

205 Structural Analysis I

First term in this theory course covers the equilibrium of forces and structures by analytical and graphical methods. Shear and moment diagrams are reviewed and expanded. Analytical and graphical analysis of roof trusses and mill building frames are worked out. The use of influence lines in analyzing loads on beams, girders, and trusses is discussed as well as absolute maximum moment in beams.

(Prerequisite, 504)

3 semester hours credit

206 Structural Analysis II

The work in the second term consists of analyzing the stresses in various types of railroad and highway bridge trusses by means of move-up load method and equivalent uniform loadings. Deflections of beams and trusses

by Method of Virtual Work (dummy load), Moment-Area, Slope and Deflection, 3-Moment Equations, Method of Least Work as well as Moment Distribution methods are used to analyze Indeterminate Structures.

(Prerequisite, 205)

3 semester hours credit

207 Concrete Design I

A consideration of the theoretical and practical principles involved in the design of reinforced concrete structures. The following subjects are thoroughly discussed: The manufacture of Portland cement; the specification requirements for fine and coarse aggregates, as well as the computations of Concrete Mix Properties and the Physical Properties of Concrete; the design and analysis of reinforced rectangular beams, beams reinforced for compression and "T" beams. Both Tabular design and the Transformed Area methods are used in the foregoing. The principles involved in web reinforcement for diagonal tension as well as bond and shear stresses are discussed and problems worked out. Consideration is given to the interpretation of the American Concrete Institute Building Code Requirements. An introduction to Ultimate Strength Design is also given.

(Prerequisite, 504)

3 semester hours credit

208 Concrete Design II

This course consists of the design and detailing of an interior bay of a building using one-way slabs, T-beams, and continuous girders. Composite beams and the various types of columns with both axial and eccentric loads as well as isolated and combined footings, both on soil and piles, are discussed and design problems worked out. The course concludes with a discussion and the design of retaining walls.

(Prerequisite, 207)

3 semester hours credit

209 Structural Design I

This course consists of a study of the design of such structural units as steel beams, girders, columns, trusses, riveted connections and steel frames as a whole. Particular attention is given to the practical phases of construction and their relation to design. The design of structural timber is also studied. In the first half of the year the student is given many problems which he works out at home and in class.

(Prerequisite, 214, 504)

3 semester hours credit

210 Structural Design II

The work in this course consists of designing and detailing larger and more complicated structures or portions of structures such as a plate girder, highway bridge or building frame.

(Prerequisite, 209)

3 semester hours credit

211 Water Supply

A general course in water supply engineering. The following items are studied: Future population forecasting; quality and quantity of water for various uses; rainfall; runoff; ground water and surface water collection and storage; water treatment processes such as slow and rapid sand filter, hardness, iron and other impurities removal; disinfection; and the design of distribution systems.

(Prerequisite, 204)

3 semester hours credit

212 Sewerage and Sewage Disposal

This course is concerned primarily with the collection and disposal of sewage and storm water. The following specific items are considered: Quantity of sewage and storm water; sewerage systems; collection of data necessary for the design of these systems; and a discussion of the modern methods of sewage treatment and sewage plant operation.

(Prerequisite, 201, 204)

3 semester hours credit

213 Structural Drawing I

The course in Structural Drawing consists of making shop drawings of the various members of modern steel frames. After making drawings of structural sections and standard connections, the student is given data from which he makes framing plans and shop details using both riveted and welded construction.

(Prerequisite, 601, 602)

3 semester hours credit

214 Structural Drawing II

Using the basic information from Structural Drawing I problems in drawing and detailing portions of a steel frame building, bridge girder and roof truss are undertaken.

(Prerequisite, 213)

3 semester hours credit

ELECTRICAL ENGINEERING TECHNOLOGY

301 Direct-Current Circuit Theory

This course is designed to give the student the required understanding of fundamental direct-current circuit theory. It deals with such concepts as electric current, electromotive force, resistivity and resistance, insulation, Ohm's law, series and parallel d-c circuits, d-c power and energy, Kirchhoff's laws, superposition and Thévenin's theorems, magnetism, magnetic fields and electromagnetic circuits, d-c instruments, and inductive and capacitive d-c transient circuits.

(Prerequisite, 701, 702)

3 semester hours credit

302 Alternating-Current Circuit Theory

In this course lectures and problems are presented dealing with fundamental alternating-current circuit theory. Involved are sinusoidal and non-sinusoidal electromotive forces and currents, vector representation of sine waves, complex and polar notation, voltage, current, impedance, admittance, power and power factor calculations for series and parallel a-c circuits, resonant conditions, network theorems, magnetically-coupled circuits, a-c instruments and elementary polyphase systems.

(Prerequisite, 301)

3 semester hours credit

303 Direct-Current Machinery

This course involves the principles of operation and testing methods of d-c machinery. It includes the consideration of shunt, series, and compound motors and generators, with emphasis on problems of commutation, armature reaction, losses, efficiencies, stray power, ratings, methods of test as well as auxiliary equipment such as protective devices. The application of d-c machinery to industry is also involved. A review of complex algebra will be given in the latter part of this course.

(Prerequisite, 301)

3 semester hours credit

304 Alternating-Current Machinery

This course involves the theory of single-phase and polyphase transformers, as well as a-c machinery. Construction and principles of operation of the constant-potential, constant-current, autotransformer, and other types of transformers are considered with emphasis on the vector diagrams, core losses and methods of test. Attention is also given to the principles of operation of the a-c induction motor, synchronous motor and alternator. The theory of operation, characteristics, load conditions and methods of testing are considered in detail.

(Prerequisite, 302, 303)

3 semester hours credit

305 Electronics for Industry

This course deals with the basic electron tubes, especially those used in industry for control purposes, as well as electronic control and regulation circuits. A study of the high-vacuum diode and triode, thyatron and phototube is made as well as amplifier theory, rectification and filtering, and general industrial control circuit application.

(Prerequisite, 302, 303)

3 semester hours credit

306 Transmission and Distribution Theory

This course is concerned with the problems pertaining to the transmission and distribution of a-c energy at power frequencies. Typical transmission-line problems are considered, involving normal and abnormal or fault conditions. The method of symmetrical components is used in the solution of certain problems. Also considered is protective and station equipment as well as trends in the power industry.

(Prerequisite, 304)

3 semester hours credit

353 Direct-Current Machinery Laboratory

This course is designed to apply the information gained from the course Direct-Current Machinery. A number of tests are performed on d-c shunt, series and compound motors as well as tests on d-c shunt and compound generators. Involved also are experiments on parallel operation of d-c generators, stray power and opposition tests.

(Prerequisite, 303 or concurrently)

3 semester hours credit

354 Alternating-Current Machinery Laboratory

This course offers laboratory work paralleling the lectures of the course Alternating-Current Machinery and includes experiments on a-c power circuits, polyphase circuits, polyphase power measurements, constant-potential transformers, synchronous machinery and induction machinery.

(Prerequisite, 304 or concurrently)

3 semester hours credit

355 Electronics for Industry Laboratory I

This course is designed to introduce the non-electronic major student to necessary electronic devices and circuits that might be encountered in industrial applications.

Experiments are performed on the use of the cathode-ray oscilloscope, the diode, triode and thyatron tubes, voltage amplifiers, feedback amplifiers, magnetic amplifiers and power rectifiers.

(Prerequisite, 305 or concurrently)

3 semester hours credit

356 Electronics for Industry Laboratory II

This laboratory course offers an introduction to the subject of the control and regulation of industrial equipment and processes by electronic means. Experiments are performed on the control of motor speed and generator voltage by electronic circuits. Available also are experiments on induction and dielectric heating, and the thyatron six-tube rectifier. A portion of this laboratory will be devoted to the study of the components and operation of servomechanisms.

(Prerequisite, 355)

3 semester hours credit

ELECTRONIC ENGINEERING TECHNOLOGY

401 Wave Propagation

Designed especially for students taking the Electronic Engineering curriculum, this course deals with the fundamental principles of waves, with particular applications to electromagnetic radiation. Interference, diffraction, and polarization will be treated in detail. A considerable part of the course will be devoted to the study of antennas and the properties of the ionosphere.

(Prerequisite, 701, 702, 801, 802)

3 semester hours credit

402 Semiconductors and Transistors

This course covers the theory of semiconductors and transistors, and is about evenly divided between fundamental physics and circuits. Topics include nature of semiconductors, crystal diodes, holes and the transistor, photoelectric effect, junction transistors, electronics of transistors, circuits and circuit theory.

(Prerequisite, 301, 801, 802)

3 semester hours credit

403 Electrical Measurements

The successful use of modern electronic equipment in the research or development laboratory and in many operational fields requires a knowledge of the equipment and techniques employed in making precise electrical measurements. This course is intended to give the student a thorough understanding of the modern equipment and procedures used in making accurate d-c and a-c measurements of voltage, current, power, resistance, capacitance, inductance, impedance, frequency, tube characteristics, etc. Both the direct and the more accurate substitution methods are investigated. Various procedures for instrument calibration are studied. The factors limiting and controlling the precision of the results are analyzed. This lecture course provides a sound basis for future laboratory work.

(Prerequisite, 704, 301, 302)

3 semester hours credit

405 Electron Tubes and Circuits I

This course begins with a review of electron theory, then the theory of electron emission by thermionic, photoelectric, secondary and field means, including the study of the construction and processing of various types of cathodes. The construction and evacuation of tubes is discussed. The diode tube with space charge phenomena is studied, leading to the control of electrons in vacuum tubes. The static and dynamic characteristics of various tube types are covered. Rectifier action is studied for both vacuum and gas filled tubes, together with the control of discharges in gas filled tubes. A study is made of multipurpose and special tubes, followed by the vacuum and gas tubes as control devices.

Single and polyphase rectifier circuits are studied, including choke and condenser input filters, and electronically regulated power supplies. Triodes and multigrid tubes and their equivalent amplifier circuits are discussed, followed by the cathode ray tube as a display device.

(Prerequisite, 301, 302, 704)

6 semester hours credit

406 Electron Tubes and Circuits II

This course starts with audio frequency amplifiers, first studying the voltage type and later power amplifiers. Included are the following topics: Distortion; Decibels; Input admittance; Resistance and Transformer coupling; D-c amplifiers; Photo-tube amplifiers; Current amplifiers; Volume control

methods; Sources of noise; Maximum power output; Plate efficiency; Push-pull amplifiers; Classes A, AB and B operation; and Feedback amplifiers. Transistor characteristics are studied, followed by Transistor circuits as applied to small signal amplifiers. Various transistor amplifier configurations are compared and the equivalent circuits are derived.

(Prerequisite, 405)

6 semester hours credit

407 Communication Engineering I

This course opens with video amplifiers then to tuned voltage amplifiers, admittance and neutralization circuits, including grounded grid amplifiers, followed by class C and B power amplifiers, and then the study of LC oscillators, including the various feedback circuits, crystal oscillators, parasitic oscillations and special oscillator circuits. This is followed by a study of amplitude modulators, detectors and mixers, and then amplitude modulated transmitters and super-heterodyne receivers. Attention will be given to problems of selectivity, sensitivity, stability and fidelity of receivers.

(Prerequisite, 406)

6 semester hours credit

408 Communication Engineering II

This course begins with a study of wave guides and then continues with Frequency and Phase Modulation with reference to the production and detection of these types of modulation and the response of networks, and detection of F.M., P.M. waves. Then the study of Wave Shaping and Pulse Circuits is introduced, including the Multivibrator, Blocking Oscillator, Phantastron, Operational Amplifiers, Clipping and Clamping Circuits. Microwave tubes such as the Klystron Traveling Wave Tube, Magnetrons are included. Several lectures on Advanced Transistor Circuits completes the course.

(Prerequisite, 407)

6 semester hours credit

456 Electronic Laboratory

This course opens with an evening on the correct use of the test equipment used in the experiments.

The experiments in this course cover most of the subjects that have been covered by lecture in Electron Tubes and Circuits I and II. They include electron emission, gas diodes, triodes, transistor characteristics, filter circuits, iron core reactors, thyratrons, half and full wave rectifiers, voltage-regulated power supplies, voltage amplifiers, resistance coupled cascade amplifiers, feed-back amplifiers, photocells, sawtooth generators, cathode ray tubes and oscilloscopes. The use of impedance bridges and RF transmission lines is included in this course.

Laboratory reports are required on each experiment and the class is broken up into small groups so that each student has an adequate chance to participate in the experiment. A final examination is also given.

(Prerequisite, 406 or concurrently)

3 semester hours credit

457 Advanced Electronic Laboratory I

The experiments in this course cover the theory subjects studied in the Communication Engineering course and advanced audio subjects from Electron Tubes and Circuits II. They include transistorized audio amplifiers, push-pull audio amplifiers, transformer coupled audio amplifiers, narrow and wide band intermediate frequency amplifiers, detectors, distortion in audio amplifiers, video amplifiers, testing and alignment of complete radio receivers, frequency multipliers, crystal oscillators, power oscillators, audio oscillators, Class B and C RF amplifiers including neutralization, amplitude modulated RF amplifiers, balanced modulators, single side band generators, standing wave measurements, and use of Q-meters.

(Prerequisite, 407, or concurrently, 456)

3 semester hours credit

458 Advanced Electronic Laboratory II

The experiments in this course cover the theory subjects studied in the Communication Engineering II course. They include discriminators, ratio detectors, gated beam tubes, limiters, reactance modulators, networks in FM circuits, blocking oscillators and deflection circuits, clipping and clamping circuits, frequency dividing circuits used as counters, Phantastrons and multivibrators. A complete television receiver in the form of a demonstrator is also studied for alignment, waveforms and trouble shooting, also pulse delay lines, analog computers, wave guides, slotted lines and transient circuits.

(Prerequisite, 408 or concurrently)

3 semester hours credit

MECHANICAL ENGINEERING TECHNOLOGY**501 Applied Mechanics I**

The subjects treated are collinear, parallel, concurrent, and nonconcurrent force systems in a plane; the determination of the resultant of such systems by both algebraic and graphical means, the forces required to produce equilibrium in such systems; stresses in trusses and frames.

(Prerequisite, 701, 702, 801, 802)

3 semester hours credit

502 Applied Mechanics II

A continuation of Applied Mechanics I in which the subjects treated are problems involving static friction, such as the inclined plane and the wedge; force systems in space; first moments as applied to the determination of centers of gravity of areas and solids; second moments and the application to the determination of moments of inertia of plane and solid figures, radius of gyration, polar moment of inertia, product of inertia.

(Prerequisite, 501)

3 semester hours credit

503 Strength of Materials I

This course comprises the study of the stresses and strains in bodies subjected to tension, compression, and shear; mechanical properties of ma-

terials: special cases of stress due to axial loads; shear and bending moment in beams; a study of the common theory of beams with description of the stress distribution; design of beams.

(Prerequisite, 501, 502, 704)

3 semester hours credit

504 Strength of Materials II

This is a continuation of Strength of Materials I and includes the consideration of the deflection of statically determinate beams; the strength of shafting and springs due to torsional stress; combined stresses in members due to compression, tension and bending; riveted and welded joints; thin hollow cylinders; columns, and brief consideration of strains and the relation of the stresses on different planes in a body.

(Prerequisite, 503)

3 semester hours credit

505 Heat Engineering I

The purpose of the course is to familiarize the student with the theory of heat as applied to prime movers.

The fundamentals of thermodynamics are discussed in this course and include the general theory of heat and matter; first and second laws of thermodynamics; equations of state; fundamental equations of thermodynamics; laws of perfect gases; properties of vapors including use of tables and charts; and the general equation for the flow of fluids. Particular emphasis is given to the properties of steam, the use of the steam tables, and the Mollier diagram.

Included in this course is a study of fuels and combustion of fuels as applied to steam boilers. Steam generators and auxiliaries are discussed as well. A large number of problems related to the apparatus considered are solved.

(Prerequisite, 701, 702, 801, 802)

3 semester hours credit

506 Heat Engineering II

This course is a continuation of Heat Engineering I and includes the descriptions of the many kinds of apparatus used in the steam power plant such as steam engines, turbines and auxiliary equipment, including pumps, condensers, heaters, fans, etc. In addition to the above, such items as draft, chimneys, coal and ash handling equipment, piping and valves as well as power plant layouts are studied. Besides the study of steam apparatus, air compressors, internal combustion engines, gas turbines and refrigeration are briefly considered. Problems related to the above equipment are solved.

(Prerequisite, 505)

3 semester hours credit

507 Mechanism

Study of displacement, velocity and acceleration of basic mechanisms employed in machine design. Analysis and design of cams, rolling contact drives and linkages. Theory of gear tooth design. Properties and limitations of involute gears. Design of simple and epicyclic gear trains. Analog computer analysis.

(Prerequisite, 501, 502, 603, 604)

3 semester hours credit

508 Machine Design I

The first semester course in Machine Design consists of the following topics: Materials and their properties; stress analysis, dynamic stresses and stress concentration; stresses in long and short columns such as connecting rods and links, fatigue of metals and endurance diagrams as used in reversed stresses; general manufacturing considerations; design of weldments.

(Prerequisite, 504)

3 semester hours credit

509 Machine Design II

The second semester consists mainly of the following: Riveting as applied to machine elements; design of screw fastenings; keys, pins and cotters; press, shrink and friction joints; flat, helical and torsion springs; cylinder heads and cover plates; brakes, flywheel design, gearing.

(Prerequisite, 508)

3 semester hours credit

551 Mechanical Engineering Laboratory I

This course includes a series of experiments upon various kinds of equipment to demonstrate under actual conditions the principles developed in several courses. Tests on instrumentation, flow measurement, hydraulic machinery, stationary steam and internal combustion engines and simple testing of materials are performed. A report on the results obtained from the test and comparisons between related equipment is written for each experiment.

(Prerequisite, 504, 506)

3 semester hours credit

552 Mechanical Engineering Laboratory II

This course is a continuation of Mechanical Engineering Laboratory I with a series of experiments upon more advanced types of equipment. Tests are run on heating, refrigerating and air conditioning equipment, additional steam and internal combustion engines having a greater number of possible variables, and various materials of construction.

(Prerequisite, 551)

3 semester hours credit

DRAWING

601 Engineering Drawing I

This course is planned to meet the requirements of a class composed of students who have had no previous instruction in drafting, and also for those who may have had one or two years' work in preparatory schools.

Solutions are required for both class and home assignments. The topics studied in these assignments include technique practice, instructions for read-

ing a scale, tangent arcs and lines, lettering, the conic curves, orthographic projections, primary, auxiliary, and oblique views.

A lecture is given at the opening of each class and individual instruction is given during the remainder of the class period.

3 semester hours credit

602 Engineering Drawing II

This course is a continuation of Engineering Drawing I. Solutions are required for both class and home assignments. The topics studied in these assignments include development of objects, intersections, isometric, cavalier and cabinet drawing, sections, dimensions, inking, helix and application, screw threads, detail and assembly drawings. A number of practical problems are included which relate to future professional courses.

A lecture is given at the opening of each class, and individual instruction is given during the remainder of the class period. The work in courses Engineering Drawing I and II is planned to give the student a thorough training in the fundamental principles of Engineering Drawing so that he may easily do the drafting required in his professional course.

(Prerequisite, 601)

3 semester hours credit

603 Machine Drawing I

This course is conducted on a lecture-laboratory basis with the student working out problems under supervision. The fundamental principles representing the shape and specifying the size of such machine elements as castings, forgings, fabricated weldings, etc., are taught. The mediums used are multi-view orthographic projection, auxiliary and sectional views, along with the appropriate dimensioning techniques. Lectures and reading assignments are correlated with the classroom problems and cover such topics as the drawing techniques applicable to the particular study, American Standard drafting-room practices, methods and materials of machine production, fractional and decimal dimensioning systems, fasteners, bearings, lubrication, stamping, methods of reproduction, etc.

The types of drawings made and analyzed include preliminary machine sketches and assemblies, dimensioned detail working drawings from machine assemblies and assembly drawings from machine details.

(Prerequisite, 601, 602)

3 semester hours credit

604 Machine Drawing II

This course begins with belt drives, spur, rack, internal, worm and bevel gears. These are followed by plate, face and cylindrical cams. Other subjects include piping, clutches, couplings, jigs, fixtures and die casting. The last half of this course is devoted to design layouts of a simple jig, stamping machine and reducing gear box.

(Prerequisite, 603)

3 semester hours credit

MATHEMATICS**700 Pre-Engineering Mathematics**

This course is devoted to a thorough study of Algebra I and Plane Geometry.

701 Algebra

Although the primary purpose of this course is to lay a thorough groundwork for the subsequent courses in Analytical Geometry, Calculus, and Applied Mechanics, it is nevertheless a complete unit in itself, and will enable the student to handle a considerable number of the problems arising in engineering practice.

Proceeding from a rapid review of the fundamental operations of Algebra, the work continues with a thorough study of fractions, functions, linear and quadratic equations, equations in quadratic form, graphs, exponents, complex numbers, binomial expansion, variation, and equations of higher degree than the second.

(Prerequisite, 700 or Mathematics Placement Test)

3 semester hours credit

702 Trigonometry

This course includes the solution of all triangles by both natural and logarithmic functions, identities, radian measure, principal values and the solution of trigonometric equations. Particular attention is given to the applications of Trigonometry to engineering practice.

(Prerequisite, 701)

3 semester hours credit

703 Analytic Geometry and Differential Calculus

This course provides a smooth transition from algebra and trigonometry into the Calculus. Included are the studies of the straight line, the circle, and conic sections, using rectangular coordinates only. The graphs of trigonometric, logarithmic, and exponential functions are also covered. Then follows the differentiation of algebraic and transcendental functions, both explicit and implicit, with some applications. Slopes of curves, maxima and minima, derivatives of higher order, velocity and acceleration in rectilinear motion are included.

(Prerequisite, 701, 702)

3 semester hours credit

704 Integral Calculus

This course deals with integration as the inverse of differentiation as well as the limit of summation. The topics covered are methods of integration; use of integral tables; differential equations with separable variables; the differential equation of rectilinear motion; definite integrals; areas in rectangular coordinates; length of curves; areas of surfaces of revolution; volumes of solids of revolution; multiple definite (iterated) integrals; centroids of plane areas; moment of inertia.

(Prerequisite, 703)

3 semester hours credit

PHYSICS**801 Physics I**

This course covers the principles of mechanics. Among the topics covered are force; energy; work; statics; elasticity; linear, rotational and harmonic motion; liquids and gases.

Each lecture is followed by a demonstration period and a problem period in which the student learns the practical application of the physical laws being studied.

(Prerequisite, 701, 702 or concurrently) 3 semester hours credit

802 Physics II

This course includes a study of wave motion, sound, heat, light and electricity. The section in heat involves thermometry, expansion, calorimetry, behavior of gases, vaporization and transfer of heat. Under the subject of light are reflection, refraction, dispersion, diffraction and interference, lenses, and optical instruments. The study of electricity includes magnetism, electrostatics, resistance, capacitance, inductance, alternating currents, and series and parallel circuits.

As in course Physics I each lecture is followed by both a demonstration period and a problem period.

(Prerequisite, 801, 702 or concurrently) 3 semester hours credit

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.....19.....

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Age Date of Birth Married ☐ Single ☐

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Name of your employer Nature of your employment

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I have attended, including other schools of the Northeastern University system, the following schools above grammar grade (if attendance at a university, *designate school*):

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		1	2	3	4			

I request advanced standing credit for previous college work completed at (name of institution)

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☐ Curriculum leading to the Degree of Bachelor of Science.

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☐ I do not wish to pursue a complete curriculum but, as a special student, wish to enroll in the following courses:

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Please answer the following questions:

Have you passed a course in Plane Geometry?

If so, give approximate year

Are you to take these courses under the Veterans Administration?

Yes	<input type="checkbox"/>	<input type="checkbox"/> Korean War (P.L. 556)
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Signature of Student

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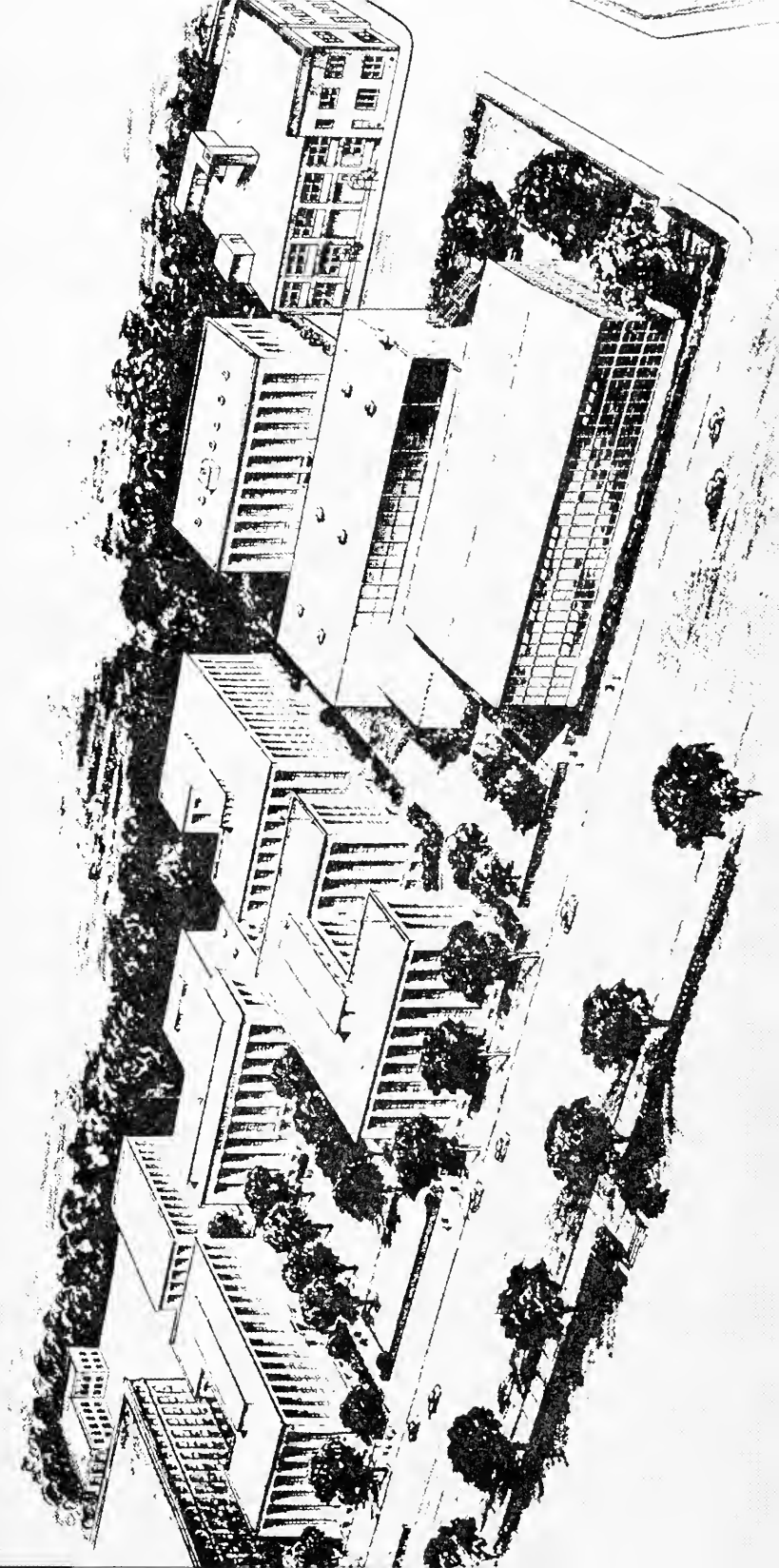
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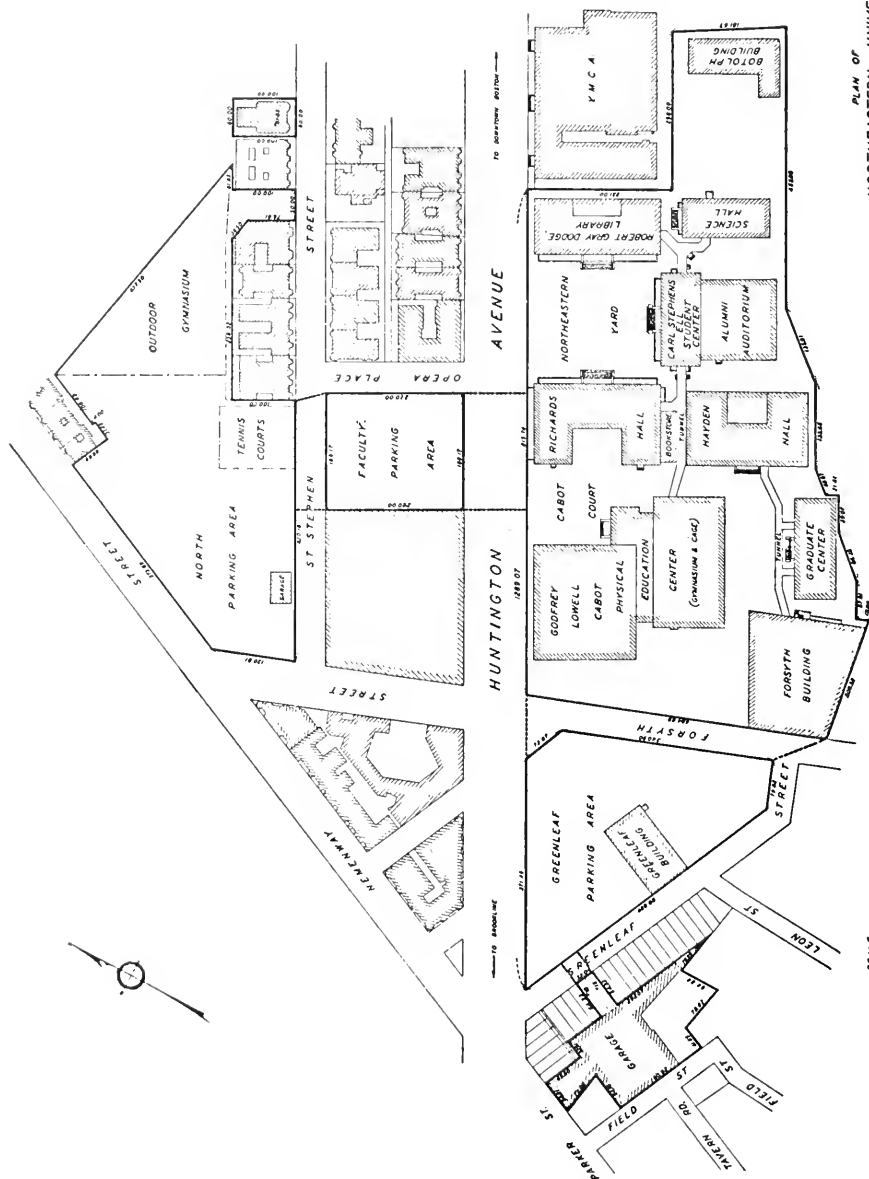
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NORTHEASTERN UNIVERSITY

AIMS AND SCOPE OF THE UNIVERSITY

Founded in 1898, Northeastern University is incorporated as a privately endowed nonsectarian institution of higher learning under the General Laws of Massachusetts. The State Legislature by special enactment has given the University general degree-granting powers. The University is governed by a Board of Trustees who are elected by and from the Northeastern University Corporation which is composed of more than a hundred and twenty-five distinguished business and professional men.

From its beginning Northeastern University has had as its dominant purpose the discovery of community educational needs and the meeting of these in distinctive and serviceable ways. The University has not duplicated the programs of other institutions but has sought to pioneer new areas of educational service.

A distinctive feature of Northeastern University is its Co-operative Plan, initiated by the College of Engineering in 1909 and subsequently adopted by the Colleges of Business Administration (1922), Liberal Arts (1935), and Education (1953). This serviceable educational method enables students to gain valuable practical experience as an integral part of their college programs and also provides the means by which they may contribute substantially to the costs of their education. The Plan has been extended to the graduate level in several fields of engineering in co-operation with industrial corporations located throughout the United States.

In the field of adult education, programs of study have been developed to meet a variety of needs. Since 1906 evening curricula have been offered leading to the bachelor's degree in business and carefully planned to serve mature students who are employed full time during the day but who are desirous of broadening their educational background by part-time study. Similar evening programs in the arts and sciences, in engineering, and in teacher education have been added in recent years. All formal courses of study leading to degrees through evening programs are approved by the appropriate college faculty and are subject to the same quantitative and qualitative standards as the regular day curricula.

The following is a brief outline of the aims and scope of the University's programs.

I. The Five Colleges

1. *The College of Liberal Arts*

The College of Liberal Arts offers majors in the usual fields of the arts and sciences leading to the degrees of Bachelor of Arts and Bachelor of Science. With the exception of pre-professional programs, day curricula are normally five years in length and operated on the Co-operative Plan. In all majors except chemistry and physics, however, qualified students with the approval of the dean may elect to complete requirements for the degree on a full-time plan in four years.

The College also offers a number of its courses during evening hours, constituting a program leading to the Bachelor of Arts degree with curricula in economics, English, history, political science, and sociology.

2. *The College of Education*

The College of Education offers the option of study on the conventional four-year, full-time plan or on the five-year Co-operative Plan, which provides for a period of teacher internship in various school systems of the Greater Boston area. Both programs lead to the degree of Bachelor of Science in Education and are designed particularly to meet the needs of high school graduates who desire to prepare themselves for teaching or administrative positions in elementary and secondary schools.

The College also offers evening curricula leading to the degree of Bachelor of Science in Education in co-operation with the College of Liberal Arts.

3. *The College of Business Administration*

The College of Business Administration offers day programs of study in the principal fields of business leading to the degree of Bachelor of Science in Business Administration. The day programs are offered on the five-year Co-operative Plan, under which students gain substantial practical experience in the fields for which they are preparing as an integral part of their undergraduate course of study.

4. *The College of Engineering*

The College of Engineering offers five-year co-operative curricula in civil, mechanical, electrical, chemical, and industrial engineering leading to the degree of Bachelor of Science with specification according to the engineering department in which the student qualified.

The College also offers during evening hours a full program leading to the degree of Bachelor of Science in Electrical Engineering. This program extends over nine years, covers the identical courses given in the day co-operative curriculum, and meets the same qualitative and quantitative standards of scholarship.

5. *University College*

University College, so called because it draws upon the resources of the other Colleges of the University, offers courses of study leading to certificates, associate degrees, or to the Bachelor of Science degree. Programs of the College are designed specifically to meet the needs of older, more mature students who wish to undertake part-time programs of education during evening hours.

The quality standards of instruction and the requirements for its degree are wholly consistent with those of the other Colleges of Northeastern University. University College does not duplicate the offerings of the Colleges of Liberal Arts, Business Administration, Education, and Engineering, but provides curricula which cut across traditional subject matter areas and meet the particular needs of adults desiring formal programs of professional development on a part-time basis.

II. The Graduate School

The Graduate School of the University offers day and evening programs of study leading to degrees in the fields of arts and sciences, education, business, and engineering. Some of these programs are offered on the Co-operative Plan; others provide teaching and research fellowships for able candidates. Administrative headquarters for all graduate programs are the first floor of the Graduate Center Building, where the offices of the Dean and of the several directors of professional programs are located.

III. Lincoln Institute

Lincoln Institute offers evening programs of study in several fields of science and engineering technology leading to the degree of Associate in Science or Associate in Engineering. The courses of study are of college grade and cover much of the technological subject matter customarily included in schools of engineering, but the curricula are less extensive in scope than those required for the baccalaureate degree in engineering. They prepare students to work with professional engineers in various technical capacities.

IV. Adult and Continuing Education

The Office of Adult and Continuing Education provides special programs and services for the business and industrial community. These include programs in management development, seminars, conferences, institutes, and forums designed to communicate information about current trends in various areas. The Office also sponsors the Bureau of Business and Industrial Training, which sets up both off-campus and on-campus, short-term, non-credit courses to meet the specific training needs of industrial organizations in New England.

V. Research Activities

The faculty of the University are engaged in a wide variety of basic research projects in business, science, social science, and engineering. These are co-ordinated by the Dean of Research Administration, whose services are University-wide and available to the faculties of all the Colleges.

Although Northeastern is primarily concerned with undergraduate and graduate instruction in the areas of arts and sciences, business, engineering, and teacher education, the University believes that the most effective teaching and learning takes place in an environment characterized by research activities directed toward extending the frontiers of knowledge.

BUILDINGS AND FACILITIES

LOCATION

Northeastern University is located on Huntington Avenue in the Back Bay section of Boston. The main administrative offices of the University are located in Richards Hall.

The chief railroad centers of Boston are the North and South Stations. To reach the University from the North Station, board an MTA subway car going to Park Street and transfer there to any Huntington Avenue car. To reach the University from the South Station, board a Cambridge-bound subway train and transfer at Park Street to a Huntington Avenue car. The "Northeastern" station is the first stop outside the subway.

HUNTINGTON AVENUE CAMPUS

The principal educational buildings of Northeastern University are located on a sixteen-acre site in the Back Bay section of Boston. Only one block to the west of the University lie the famous Boston Museum of Fine Arts and the beautiful public gardens-park reservation known as "The Fenway." The newer buildings of the Huntington Avenue Campus are pictured on page 5.

Following a long-range development plan, University facilities have expanded substantially in recent years. In addition to the six buildings constructed within the last two decades, several modernized older buildings are available for specialized uses. The newer buildings on the campus are interconnected by means of tunnels, so that the students may go from building to building without going out of doors in inclement weather.

In addition to classrooms and instructional offices, the principal buildings include the following:

Botolph Building — Civil Engineering Laboratories

Cabot Physical Education Center — Gymnasium, Cage, Rifle Range

Dodge Library — Library, Drawing Rooms

Ell Student Center — Student Activities, Chapel Auditorium, University Commons

Forsyth Building — Industrial and Mechanical Engineering Laboratories, Health Service

Graduate Center — Administrative Offices of the Graduate School, Physics Laboratories, Cafeteria

Greenleaf Building — ROTC Headquarters, Research Facilities

Hayden Hall — Offices of the University College, Adult and Continuing Education, and Lincoln Institute; Business, Education, and Electrical Engineering Laboratories; Art Studio

Richards Hall — Administrative Offices, Mechanical Engineering, Psychology, and Chemistry Laboratories, Bookstore

Science Hall — Chemical Engineering and Biology Laboratories

Graduate School Regulations

GENERAL REGULATIONS

ADMISSION

Admission to the Graduate School is granted to graduates of recognized colleges, universities, or institutes of technology who present satisfactory evidence of ability to pursue graduate study with profit. Specific admission requirements for departments offering graduate work will be found in the sections describing the work of each department.

Applications for admission to the day graduate programs, together with letters of recommendation and transcripts of prior college training, must be filed by March 15 of the year in which the graduate work is to be started. Applications may be obtained by writing to the Graduate School.

For admission to any part-time graduate program, a personal interview with the Director of the appropriate program is required. Transcripts of the applicant's prior college training should be presented at that time; if this is not possible, such material should be filed within six weeks after registration. No second registration will be allowed, nor will any grades of courses taken in the first registration period be issued until a transcript has been received.

REGISTRATION

At the beginning of each semester all students must register in the Graduate School office at the times specified in the calendar.

CLASSIFICATION

After a review of their transcript, graduate students are classified as regular or special.

Regular Students: Students who have a bachelor's degree from an accredited program with acceptable quality of undergraduate work are designated as regular students.

Special Students: Students whose undergraduate record is not acceptable for regular classification are designated as special students.

Admission to a course does not constitute acceptance as a candidate for a master's degree. A student who has achieved regular classification and who has completed twelve credits of required courses in his major with a grade of B will be admitted to degree candidacy.

RESIDENCE

All work for advanced degrees must be completed in residence at the University unless approval has been obtained from the Dean of the

Graduate School for work taken elsewhere. Students who are in residence and are using the facilities of the University must register for such work.

FACULTY ADVISOR

Each full-time student will be assigned a faculty advisor named by the chairman of his department of study.

PROGRAMS OF STUDY

At the time of his first registration, each full-time student must develop, with the assistance of his faculty advisor, a complete program of study for the degree for which he is registered. All subsequent changes must be approved by his faculty advisor.

Evening part-time students will be expected to complete the required courses outlined by each department, after which the elective courses may be undertaken. The study load for such students is limited to a program of two courses per semester unless special permission to carry a heavier load is given by the Director of the respective program.

GRADING SYSTEM

The performance of students in graduate courses will be recorded by the instructor by use of the following grades:

A — Excellent

This grade is given to those students whose performance in the course has been of very high graduate caliber.

B — Satisfactory

This grade is given to those students whose performance in the course has been at the level necessary for graduate credit.

C — Fair

This grade is used to indicate that the student's performance in the course may be acceptable but is not consistently at the level expected in graduate work.

F — Failure

This grade is used to indicate unsatisfactory work.

In addition, the following letter designations are used:

- E — Course registration canceled for nonattendance.
- I — Incomplete, without quality designation. This is used when a student does not take the final examination or otherwise fails to complete the work of the course.
- S — Satisfactory, without quality designation. This is used for thesis work.
- W — Withdrawn without prejudice.

An average of not less than B must be obtained in thirty course credits in order to qualify for the master's degree. If a grade of F is obtained in a required course, the course must be repeated and a grade of B or better obtained. If a grade of F is obtained in an elective course, this course may either be repeated or another elective course substituted for it. In the case of a repeated elective course, a grade of B must be obtained. A maximum of thirty-four course credits may be undertaken in qualifying for the degree.

The designation "I" will be changed to a grade upon removal of the "I" provided deficiencies are made up by the end of the semester following the one in which the "I" was reported. If the course deficiencies are not made up within the specified time, the grade of I will automatically become a grade of F. Missed final examinations cannot be made up without the approval of the Dean or Director of the program involved. Approval for such make-up is given only for emergency reasons and must be obtained within one month following the date of the missed examination.

WITHDRAWALS

No withdrawal from a course is allowed after the tenth class session. Any student who is absent from three class periods in succession without excuse is dropped from the class.

The University provides all instruction and accommodations on an academic semester basis; therefore, no refunds are granted except in cases where students are compelled to withdraw because of personal illness or other reasons beyond their control. A student must complete an official withdrawal application at the Graduate School office before being considered for a refund. In no case are refunds made after a student has attended the fifth session of a class. Questions regarding refunds should be discussed with the Bursar's office.

TIME LIMITATIONS

Course credits earned in the program of graduate study are valid for a maximum period of eight years. This time limitation is likewise applicable to any offered transfer credits.

CLASS HOURS

Day classes are scheduled for regular hours. Late afternoon and evening courses during the first and second semesters meet once a week for two hours for sixteen weeks, including the final examinations. In the summer session, classes for all programs except Education meet twice a week for a period of eight weeks. The Education summer session runs for six weeks, and the time of class meetings is adjusted accordingly. For opening and closing dates of these sessions, consult the Academic Calendars of this catalogue.

INTERVIEW AND REGISTRATION DATES, OFFICE HOURS, AND CLASS SCHEDULES

For dates of the interview and registration periods and office hours, consult the inside front cover. The registration circulars issued in August, January, and May provide information regarding class meeting times and teaching staff as well as listing the course offerings for the first semester, second semester, and summer session, respectively. Copies of these circulars may be obtained from the office of the Graduate School, Northeastern University, Boston 15, Massachusetts, or by calling COngress 2-1100.

THE MASTER'S DEGREE

Northeastern University offers programs leading to the degrees of Master of Science, Master of Arts, Master of Business Administration, and Master of Education.

The Master of Science degree may be earned in the following fields: chemical engineering, chemistry, civil engineering, electrical engineering, engineering management, mathematics, mechanical engineering, and physics.

The Master of Arts degree may be earned in the following fields: English, history, political science, and psychology.

GENERAL REQUIREMENTS

A candidate for the master's degree must complete satisfactorily an approved program conforming to the requirements of the department in which he is registered.

The requirements for the master's degree are a minimum of thirty semester hours of correlated work of graduate caliber, together with such other study as may be required by the department concerned, with the approval of the Director of the appropriate program. Department heads and the Dean are available for counsel on the selection of electives.

THESIS

If a thesis is required in partial fulfillment of degree requirements, it must show independent work based in part upon original material. The thesis should show evidence that the student has a thorough acquaintance with the literature of a limited field and must meet the approval of the instructor in charge of the work, the department head concerned, and the Dean of the Graduate School.

Instructions concerning the details of preparation of the thesis may be obtained from the Graduate School office.

COMPREHENSIVE EXAMINATION

At the discretion of the department, a final written or oral comprehensive examination may be required. No candidate may present himself for the final comprehensive examination without the permission of his faculty advisor. Also such examinations must be taken at least two weeks before the commencement at which he expects to receive his degree.

FOREIGN LANGUAGE REQUIREMENT

Some departments require an examination to show evidence of ability to read one or more foreign languages. Such examinations are given by the Modern Language Department at times set by the Dean of the Graduate School. The Modern Language Department may grant exemption from the language examination to a student who in other ways shows competence in that language.

TRANSFER CREDITS

Not more than eight semester hours of graduate credit may be transferred from other institutions towards the degree of Master of Science, Master of Arts, Master of Business Administration, or Master of Education at Northeastern. Grades in courses offered for transfer must be B or higher. Acceptance of credits for transfer will not be approved until the student is admitted to candidacy, and then only if the work submitted for transfer credit is consonant with the objective of the approved program.

THE DOCTOR'S DEGREE

Northeastern University offers programs leading to the degree of Doctor of Philosophy in the following fields: electrical engineering, chemistry, and physics.

The degree is granted to candidates who give evidence of proficiency, high attainment, and research ability in their major field and who have satisfied the specific requirements of the department in which they are enrolled.

GENERAL REQUIREMENTS

Candidates for the doctor's degree should expect to spend at least three years or the equivalent in full-time graduate study. A minimum of one year full-time residence beyond the requirements of the master's degree is required and the equivalent of at least twelve semester hours of formal course work beyond the master's degree must be completed. In addition, a doctoral thesis must be satisfactorily completed.

QUALIFYING EXAMINATION

In order to become a doctoral degree candidate, each student must pass a qualifying examination. This examination may be either written or oral or both at the discretion of the department. The Graduate School office must be notified at least two weeks before a qualifying examination is to be held, and passage or failure must be reported to that office within one week after the examination.

THESIS

After degree candidacy has been established, a candidate must complete a thesis which must embody the results of extended research and include material suitable for publication. This work should give evidence of the candidate's ability to carry out independent investigation and interpret in a logical manner the phenomena determined in the research.

The thesis must be approved by the departmental committee and prepared in a manner approved by the Graduate School. A booklet giving the details of the thesis preparation may be obtained from the above office.

COMPREHENSIVE EXAMINATION

During the time in which a student is a candidate for a doctoral degree, he must demonstrate a subject matter knowledge satisfactory

for the award of such degree. This requirement must be satisfied by a comprehensive examination passed no later than four months before the completion of the thesis. The time and type of this examination is at the discretion of the department concerned.

FOREIGN LANGUAGE

Before a candidate may take the final oral examinations, he must demonstrate a reading knowledge of two foreign languages. These proficiency examinations are given by the Modern Language Department at times set by the Graduate School. The Modern Language Department may grant exemption from the language examination to a student who in other ways shows competence in that language.

FINAL ORAL EXAMINATION

The final oral examination will be taken after completion of all other requirements for the degree. This examination cannot be held until two weeks have elapsed after the thesis has been registered and accepted by the Graduate School and must be at least two weeks before the commencement at which the degree is to be awarded.

The committee for the final oral examination for the doctoral degree is appointed by the Dean of the Graduate School on the advice of the chairman of the department. It consists of at least three full-time faculty members in addition to the Dean of the Graduate School. The Dean of the Graduate School or a faculty member appointed by him acts as chairman.

The final oral examination will include the subject matter of the doctoral thesis and significant developments in the field of the thesis work. Other fields may be included if recommended by the examining committee.

TUITION AND FEES

The policies governing the amount and the regulations pertaining to the payment of tuition and fees are established by the Executive Council of Northeastern University. The Council reserves the right to change these regulations at any time. Such changes will apply to students currently enrolled as well as new applicants for admission.

1. Schedule of Tuition and Fees

REGISTRATION FEE	\$ 10.00
Payable at time of first registration in Arts and Sciences, Business Administration and Engineering Programs.	
MATRICULATION FEE	10.00
Payable at time of establishment of Degree Candidacy for students in the Education Program; also for students in the Arts and Sciences and Engineering Programs who were registered prior to September, 1959.	
TUITION PER COURSE FOR PART-TIME STUDENTS	
Arts and Sciences, Business Administration, and Engineering	66.00
Education	60.00
TUITION PER TERM FOR CO-OPERATIVE PROGRAMS IN ENGINEERING	
	247.50
LATE PAYMENT FEE	2.00
For failure to pay tuition on due date.	
MAKE-UP FEE	5.00
For make-up final examination of any course.	
GRADUATION FEE	20.00
Payable on or before May 1 of the year in which the graduate degree is to be awarded.	

2. Payments

Tuition statements will be mailed to the students by the Student Accounts office and are payable on or before the date specified. Checks should be drawn payable to "Northeastern University."

FELLOWSHIPS AND TUITION SCHOLARSHIPS

Northeastern University has available teaching fellowships, research fellowships, and tuition scholarships for students who are engaged in graduate work. The Dean of the Graduate School will send candidates the proper application blanks upon request.

Teaching Fellowships

A number of half-time teaching fellowships are available in the Departments of English, Chemistry, History, Physics, Political Science, and Psychology. The time required for departmental assistance does not normally exceed eighteen hours a week for two semesters. Teaching fellowships carry remission of tuition and a cash stipend of \$2050 for the academic year.

Research Fellowships

Some departments employ graduate students on research projects. These fellowships carry remission of tuition for nine semester hours of academic work; stipends are comparable to those for teaching fellowships. These fellowships are normally given to doctoral candidates in their third year in order to allow them to devote their full energies to their thesis work.

Tuition Scholarships

Some engineering departments have available scholarships covering full tuition. These scholarships are awarded to co-operative graduate students in addition to the compensation which they receive from the University during their work period.

Appointments

Appointments to fellowships and tuition scholarships are ordinarily announced by April 1 for the following academic year or summer. Appointments are for a maximum of one year and are not automatically renewed.

Full-time Duties

Graduate students who hold fellowships or tuition scholarships are expected to devote full time to their studies and the duties of the grant. They may not accept outside employment without the consent of their faculty advisor and the Dean of the Graduate School.



Arts and Sciences Programs

INFORMATION APPLYING TO ARTS AND SCIENCES PROGRAMS

The curricula of the degree programs are given under each departmental heading. The descriptions of courses offered by the several departments are given so that prospective students may obtain a view of the course coverage. Preparation courses are indicated in each instance. Not all courses are offered every year, but the course offerings will be arranged in such a manner that students may make continuous progress toward the degree.

The number of students enrolled in each class will be limited to permit effective teaching at the graduate level, and the University reserves the right to cancel any course for which an insufficient number of students apply.

All courses carry two semester hours of graduate credit unless specified otherwise.

The full-time day programs in chemistry, English, history, political science, and psychology are limited to teaching fellows and research fellows. Applications for these programs must be filed by March 15th with all supporting data as required by the Graduate School. The programs for such students must have the approval of the departmental advisor before the student registers with the Graduate School.

The curricula of the evening part-time programs are specified by the departments. All part-time students must register in the Graduate School and present a transcript of undergraduate record at that time.

A circular describing the courses to be offered during the first semester and giving the registration and interview dates is issued in July. A similar circular for the second semester is issued in December, and for the summer session one is issued in May.

ACADEMIC CALENDAR**Chemistry, Mathematics, and Physics Courses****May 1961 - June 1962****SUMMER SESSION 1961**

Interview and Registration Period	Monday-Saturday	May 22-June 3
Memorial Day, Office Closed	Tuesday	May 30
Classes Begin	Monday	June 5
Independence Day, No Classes	Tuesday	July 4
Classes End	Tuesday	July 25
Examination Period	Wednesday-Thursday	July 26-July 27

FIRST SEMESTER 1961-1962

Registration Period for Former Students	Wednesday-Saturday	July 5-Sept. 9
Interview and Registration Period for New Students	Monday-Saturday	Aug. 14-Sept. 9
Labor Day, Office Closed	Monday	Sept. 4
Classes Begin	Monday	Sept. 11
Columbus Day, No Classes	Thursday	Oct. 12
Veterans' Day, No Classes	Saturday	Nov. 11
Thanksgiving Vacation	One Week	Nov. 20-Nov. 24
Classes Resume	Monday	Nov. 27
Christmas Vacation	Two Weeks	Dec. 19-Jan. 1
Classes Resume	Tuesday	Jan. 2
Classes End	Friday	Jan. 12
Examination Period	Monday-Friday	Jan. 15-Jan. 19
No Classes	Monday-Friday	Jan. 22-Jan. 26

SECOND SEMESTER 1961-1962

Registration Period for Former Students	Tuesday-Saturday	Jan. 2-Jan. 27
Interview and Registration Period for New Students	Monday-Saturday	Jan. 8-Jan. 27
Classes Begin	Monday	Jan. 29
Washington's Birthday, No Classes	Thursday	Feb. 22
Patriots' Day, No Classes	Thursday	April 19
Classes End	Friday	May 11
Make-up for Classes Missed		
Thursday, April 19	Thursday	May 17
Examination Period	Monday-Friday	May 21-May 25

ACADEMIC CALENDAR**English, History, Political Science,
and Psychology Courses****July 1961 - June 1962****FIRST SEMESTER 1961-1962**

Registration Period for Former Students	Wednesday-Saturday	July 5-Sept. 16
Interview and Registration Period for New Students	Monday-Saturday	Aug. 21-Sept. 16
Labor Day, Office Closed	Monday	Sept. 4
Classes Begin	Monday	Sept. 18
Columbus Day, No Classes	Thursday	Oct. 12
Veterans' Day, No Classes	Saturday	Nov. 11
Thanksgiving Vacation	One Week	Nov. 20-Nov. 24
Classes Resume	Monday	Nov. 27
Christmas Vacation	Two Weeks	Dec. 19-Jan. 1
Classes Resume	Tuesday	Jan. 2
Classes End	Friday	Jan. 19
Examination Period	Monday-Friday	Jan. 22-26
No Classes	Monday-Friday	Jan. 29-Feb. 2

SECOND SEMESTER 1961-1962

Registration Period for Former Students	Tuesday-Saturday	Jan. 2-Feb. 3
Interview and Registration Period for New Students	Monday-Saturday	Jan. 8-Feb. 3
Classes Begin	Monday	Feb. 5
Washington's Birthday, No Classes	Thursday	Feb. 22
Spring Vacation	One Week	April 16-April 21
Classes End	Friday	May 25
Memorial Day, No Classes	Wednesday	May 30
Examination Period	Monday-Friday	May 28-June 1

COMMITTEE ON GRADUATE STUDY IN ARTS AND SCIENCES

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Associate Professor of History and Acting Chairman of the Department

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Dean of Administration of Day Undergraduate Programs

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Professor of Mathematics and Chairman of the Department

A. BERTRAND WARREN, A.B., M.A., Ph.D.

Professor of Psychology and Chairman of the Department

WILLIAM C. WHITE, S.B., Ed.M., Eng.D.

Vice President and Provost of the University

R. GREGG WILFONG, A.B., M.A.

Associate Professor of Political Science and Chairman of the Department

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EDWARD R. ATKINSON	<i>Arthur D. Little, Inc.</i>
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JAMES T. BARRS	<i>Associate Professor of English, Northeastern University</i>
WALLACE P. BISHOP	<i>Associate Professor of History, Northeastern University</i>
WALTON B. BISHOP	<i>Chief, External Research Management Office, Electronic Material Sciences Laboratory, Air Force Cambridge Research Laboratories</i>
EUGENE J. BLACKMAN	<i>Associate Professor of English, Northeastern University</i>
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NELSON H. KEMP	<i>Principal Research Scientist, Avco Manufacturing Corp.</i>
ROBERT D. KLEIN	<i>Assistant Professor of Research in Communications, Northeastern University</i>
GIOVANNI LANZA	<i>Professor of Physics, Northeastern University</i>
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STEFAN PETERS	<i>Consultant, Arthur D. Little, Inc.</i>
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VICTOR R. STAKNIS	<i>Associate Professor of Mathematics, Northeastern University</i>
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IRVING WEISS	<i>Statistician, The Mitre Corporation</i>
ROBERT N. WIENER	<i>Assistant Professor of Chemistry, Northeastern University</i>
R. GREGG WILFONG	<i>Associate Professor of Political Science, Northeastern University</i>
ARTHUR WOUK	<i>Staff Consultant, Sylvania Electric Products, Inc.</i>
HUSEYIN YILMAZ	<i>Senior Research Staff, Sylvania Electric Products, Inc.</i>
HAROLD S. ZAMANSKY	<i>Assistant Professor of Psychology, Northeastern University</i>
NORMAN L. ZUCKER	<i>Instructor in Political Science, Northeastern University</i>

C H E M I S T R Y

Admission

To be enrolled for graduate work in chemistry, applicants must have obtained a bachelor's degree from a recognized institution with an undergraduate program which included at least one year of general chemistry, analytical chemistry, organic chemistry and physical chemistry, two years of mathematics including one year of differential and integral calculus, and one year of physics. Additional work in mathematics and physics is desirable.

THE MASTER'S DEGREE

FULL-TIME PROGRAM

Orientation Examination

All students entering on the full-time program must take an orientation examination during the week preceding registration. This examination will cover undergraduate work in inorganic, organic, physical, and analytical chemistry. This examination will be used by the advisor of the graduate student in making up his program of study.

Program

Each student will have a faculty advisor who will approve his program of study. All students will be required to take the following courses:

11.111	Adv. Inorganic Chemistry	2	11.509	Seminar	1
11.112	Adv. Inorganic Chemistry	2	11.510	Seminar	1
11.222	Adv. Organic Chemistry	2	11.515	Thesis	2
11.331	Thermodynamics	2	11.516	Thesis	2
11.411	Adv. Analytical Chemistry	2	11.525	Intro. to Research I	4
11.507	Seminar	1	11.526	Intro. to Research II	4
11.508	Seminar	1			

EVENING PART-TIME PROGRAM

The admission requirements for this program are the same as for the full-time program, but students may progress according to their abilities and the time available.

Required Courses:

11.111, 112	Advanced Inorganic Chemistry	4
11.221, 222	Advanced Organic Chemistry	4
11.331	Thermodynamics	2
11.332	Atomic and Molecular Structure	2
11.412	Optical Methods of Analysis	2

Elective Courses:

Six semester hours must be elected from chemistry courses, including at least one organic chemistry course. Eight semester hours may be elected from any courses in chemistry, mathematics, or physics for which the student has the necessary preparation.

THE DOCTOR'S DEGREE**Qualifying Examination**

The qualifying examination for the Ph.D. degree is taken normally at the end of the first year of graduate study. If any part of the examination is failed, it may be repeated with permission of the department. On the basis of the qualifying examination, a student may be admitted to candidacy for the Ph.D. degree.

Language Requirements

The languages in which proficiency must be demonstrated in accordance with the general Graduate School regulations will be specified by the department.

Comprehensive Examination

The comprehensive examination requirement will be satisfied by a series of written examinations to be given at times established by the department.

Thesis

After degree candidacy has been established, arrangements for a thesis advisor must be completed. A thesis committee will also be appointed by the chairman of the department. This committee will be kept informed concerning the progress of the thesis and will approve the thesis in its final form.

Final Oral Examination

This examination will be held in accordance with the Graduate School regulations.

DESCRIPTION OF COURSES

11.111 Advanced Inorganic Chemistry (Offered yearly, 1st sem.)

Preparation: One year of physical chemistry and one year of inorganic chemistry

Course Content: Periodic classification of the elements, characteristics based on electronic structure, complex ion formation, oxidation-reduction, chemistry of the non-metals.

11.112 Advanced Inorganic Chemistry (Offered yearly, 2nd sem.)

Preparation: 11.111 Advanced Inorganic Chemistry

Course Content: Advanced treatment of the chemistry of metals, chemical properties of the solid state, recent developments in the field of coordination compounds, and the mechanisms and stereochemistry of inorganic reactions. The significance of nuclear properties, nuclear changes, and tracer studies in inorganic chemistry is an integral part of the course.

11.113 Coordination Chemistry (Offered 1961-62, 1st sem.)

Preparation: 11.237 Stereochemistry and 11.112 Advanced Inorganic Chemistry

Course Content: Coordination compounds; their experimental detection, calculation of stability constants, factors affecting solubility and stability constants. Ligand field theory. Acidity, color, and lability of complexes. Kinetic and stereochemical studies of inorganic reaction mechanisms.

11.221 Advanced Organic Chemistry (Offered yearly, 1st sem.)

Preparation: One and one-half years of organic chemistry

Course Content: An intensive coverage of the principal classes of organic compounds, their syntheses, and their reactions. Chemical methods of structure determination.

11.222 Advanced Organic Chemistry (Offered yearly, 2nd sem.)

Preparation: 11.221 Advanced Organic Chemistry

Course Content: A discussion of modern valence theory which leads to the electron theory of organic chemistry. This theory is the basis of a study of aromatic substitution, acid-base phenomena, and free radicals.

11.237 Stereochemistry (Offered 1962-63, 1st sem.)

Preparation: 11.222 Advanced Organic Chemistry

Course Content: Geometrical and optical isomerism in organic compounds. Correlations of physical properties with molecular configuration.

11.238 Physical Organic Chemistry (Offered 1961-62, 1st sem.)

Preparation: 11.222 Advanced Organic Chemistry

Course Content: Correlation of structures of organic compounds with their physical properties: gross physical properties, dipole moments, absorption and Raman spectra, electron and X-ray diffraction, nuclear magnetic resonance.

11.240 Mechanisms of Organic Reactions

(Offered 1962-63, 2nd sem.)

Preparation: 11.237 Stereochemistry*Course Content:* Consideration of the fundamental factors influencing the course of a chemical reaction. Study of the effects of structural and environmental changes on mechanisms of organic reactions.**11.243 Natural Products** (Offered 1962-63, 2nd sem.)*Preparation:* 11.222 Advanced Organic Chemistry*Course Content:* Structure determination, synthesis and transformations of selected classes of organic compounds of biological importance.**11.244 Biochemistry** (Offered 1961-62, 1st sem.)*Preparation:* One year of physical chemistry and one year of organic chemistry*Course Content:* Consideration of protein chemistry including structure, acid-base equilibria, protein interactions, and proteins as enzymes. Equilibria and free energy of biochemical systems. Enzyme kinetics.**11.245 Biochemistry** (Offered 1961-62, 2nd sem.)*Preparation:* One year of physical chemistry and one year of organic chemistry*Course Content:* Biological oxidation-reduction reactions. Metabolism of carbohydrates, fats, proteins, amino acids, nucleic acids, porphyrins, and steroids. Photosynthesis.**11.246 Biochemistry** (Offered 1962-63, 1st sem.)*Preparation:* One year of physical chemistry and one year of organic chemistry*Course Content:* Consideration of body fluids, permeability: chemistry of respiration, hemoglobin, electrolytes, water, and acid-base balance. The biochemistry of endocrine glands. Discussion of the chemistry of nutrition.**11.253 Organic Nitrogen Compounds**

(Offered 1962-63, 2nd sem.)

Preparation: 11.222 Advanced Organic Chemistry*Course Content:* Syntheses, properties, and reactions of organic nitro- and nitroso- compounds, amines, amides, hydroxlamines, hydrazines, azides, azo- and diazo- compounds, nitriles, and hydroxamic acids. Stereochemistry of rearrangements of nitrogen compounds.**11.330 Physical Chemical Calculations** (Offered yearly, 1st sem.)*Preparation:* Admission to graduate program*Course Content:* An intensive survey of physical chemistry through the medium of computation.**11.331 Thermodynamics** (Offered yearly, 2nd sem.)*Preparation:* One year of physical chemistry*Course Content:* First law of thermodynamics, thermochemistry second law, chemical equilibrium, solutions.

11.332 Atomic and Molecular Structure

(Offered yearly, 1st sem.)

Preparation: One year of physical chemistry*Course Content:* Atomic spectra, atomic structure, introduction to wave mechanics, structure of matter, nature of the chemical bond.**11.333 Chemical Kinetics** (Offered 1961-62, 1st sem.)*Preparation:* 11.332 Atomic and Molecular Structure*Course Content:* Transition state and collision theories of chemical reactions. Reaction velocity in gaseous and liquid systems. Catalysis, chain reactions.**11.334 Solutions of Electrolytes** (Offered 1962-63, 1st sem.)*Preparation:* One year of physical chemistry*Course Content:* Theory of solutions of electrolytes, acids and bases, electrolytic conductance, electrochemistry.**11.335 Advanced Physical Chemistry**

(Offered 1961-62, 2nd sem.)

Preparation: 11.332 Atomic and Molecular Structure*Course Content:* Introduction to statistical mechanics. Application to chemical kinetics, crystalline and liquid states. Light scattering of polymers.**11.336 Special Topics in Physical Chemistry**

(Offered 1962-63, 2nd sem.)

Preparation: 11.332 Atomic and Molecular Structure*Course Content:* Selected topics of current importance in physical chemistry.**11.337 Quantum Mechanics** (Offered 1963-64, 1st sem.)*Preparation:* 11.335 Advanced Physical Chemistry*Course Content:* Classical mechanics. Formulation of the Schrödinger equation. Perturbation methods. The W. K. B. approximation. Group theoretic methods. Applications to valence theory and spectroscopy.**11.338 Statistical Mechanics** (Offered 1963-64, 2nd sem.)*Preparation:* 11.335 Advanced Physical Chemistry*Course Content:* Ensembles. Systems of independent particles. Systems of interacting particles. Lattice statistics. Statistical thermodynamics. Quantum statistics. Applications to gases, liquids, solids, and solutions.**11.339 Radiochemistry** (Offered 1962-63, 1st sem.)*Preparation:* 11.411 Advanced Analytical Chemistry and 11.112 Advanced Inorganic Chemistry*Course Content:* Interactions of matter with high-energy radiation. The use of radioactivity as an analytical tool in chemical research. Introduction to isotope technology.**11.340 Nuclear Chemistry** (Offered 1962-63, 2nd sem.)*Preparation:* One year of physical chemistry*Course Content:* Nuclear compositions, study of isotopes, natural and artificial radioactivity, nuclear reactions.

11.411 Advanced Quantitative Analysis

(Offered yearly, 1st sem.)

Preparation: Admission to graduate program*Course Content:* A course in the theory and practice of noninstrumental methods of chemical analysis. Topics include new reagents such as organic precipitants, complex formers, and indicators; new techniques such as ion exchange and titration in nonaqueous solvents; and the analytical chemistry of the less familiar elements.**11.412 Optical Methods of Analysis** (Offered 1961-62, 2nd sem.)*Preparation:* One year of physical chemistry*Course Content:* Theory of emission and absorption spectroscopy, spectrophotometry, colorimetry, microscopy, and refractometry as applied to chemical analysis.**11.413 Electrochemical Methods of Analysis**

(Offered 1962-63, 2nd sem.)

Preparation: One year of physical chemistry*Course Content:* Theory of potentiometry, conductivity, polarography, amperometry, coulometry, and oscillography as applied to chemical analysis.**11.507 - 11.514 Seminar** (Offered yearly)*Course Content:* Reports on current fields of investigation.**11.515 - 11.516 Thesis** (Offered yearly)*Course Content:* Original research and a written dissertation thereon.**11.517 - 11.520 Thesis** (Offered yearly)*Preparation:* Admission to the Ph.D. program*Course Content:* Original research and a written dissertation thereon.**11.525 Introduction to Research I** (Offered yearly, 1st sem.)*Preparation:* Admission to the Ph.D. program*Course Content:* Lectures by members of the chemistry faculty on methods and techniques of research. Brief experimental problems to introduce specialized research techniques.**11.526 Introduction to Research II** (Offered yearly, 2nd sem.)*Preparation:* Admission to the Ph.D. program*Course Content:* Experimental work designed to develop research skills in a specialized field.**11.611 Polymer Chemistry I** (Offered yearly, 1st sem.)*Preparation:* Organic chemistry, physical chemistry*Course Content:* Basic principles of polymer chemistry. Description and classification of high polymers. Addition and condensation polymerization reactions. Survey of natural and synthetic commercial polymers, including

industrial methods of preparation. Introduction to the study of polymer structure and relation of structure to properties.

11.612 Polymer Chemistry II (Offered yearly, 2nd sem.)

Preparation: 11.611 Polymer Chemistry I

Course Content: Rheological, mechanical, thermal, optical, electrical, and chemical properties of high polymers. Survey of rubbers, plastics, and fibers and their various industrial applications. The major fields in which polymers are used will be discussed. Emphasis will be placed on modern practices and their relation to theoretical principles.

ENGLISH

Admission

To be enrolled for graduate work in English, applicants must have obtained a bachelor's degree from a recognized institution with an undergraduate program which included at least fifteen semester hours of English.

THE MASTER'S DEGREE

Program

Each student will have a faculty advisor who will approve his program of study. A student may elect an option to write a thesis for six credits or complete six graduate courses with an R designation. The R designation after a course indicates that an extra assigned paper is required, and such work will be given one credit toward the six required in substitution for a thesis. The faculty advisor must approve the R courses which are to be taken.

The following courses must be taken by all students:

30.103	Poe, Hawthorne, Melville	2	30.110	Shakespeare	2
30.106	Emerson, Thoreau,		30.114	Major Modern Dramatists	2
	Whitman	2	30.121	Principles of Literary	
30.107	Pope	2		Criticism	2
30.109	Elizabethan and Jacobean		30.132	Linguistics	2
	Drama	2			

Eight semester hours of electives must be taken from other graduate courses or from appropriate advanced undergraduate courses approved by the faculty advisor. To obtain graduate credit in advanced undergraduate courses, a student must have a grade of A or B.

Language Requirement

The language in which proficiency must be demonstrated in accordance with the general Graduate School regulations will be specified by the department.

THESIS SUBSTITUTION COURSES

Students who elect an option in assigned reading and reports instead of a thesis will be registered in any of the following courses:

30.103R	30.107R	30.110R	30.121R
30.106R	30.109R	30.114R	30.132R

The material covered in these courses is the same as for those without the R designation, but an assigned paper is required in addition to the regular work of the course. Three semester hours credit, which includes one semester hour credit toward the six required for this substitution, will be given in each case.

DESCRIPTION OF COURSES

30.101 The English Novel (Offered 1961-62, 1st sem.)

Course Content: Background and sources of the first English novels, followed by a study of types and techniques which developed during the latter half of the eighteenth century; detailed consideration of major representative novelists from Richardson to the early Victorians.

30.103 Poe, Hawthorne, Melville (Offered 1962-63, 1st sem.)

Course Content: Critical study of the works of Poe, Hawthorne, and Melville, employing the aesthetic rather than the historical approach.

30.106 Emerson, Thoreau, Whitman (Offered 1961-62, 2nd sem.)

Course Content: A study in transcendentalism as it found expression in America in the work of three major authors. The course will be based on the examination of backgrounds, a close study of selected texts, discussion of the significance of ideas and forms.

30.107 Pope: From Windsor Forest to the Dunciad of 1743 (Offered 1961-62, 1st sem.)

Course Content: Pope's satiric and mock-heroic modes, with close analysis of individual works.

30.108 Milton (Offered 1962-63, 2nd sem.)

Course Content: A textual study of Milton's poetry, with particular emphasis on *Paradise Lost*, the minor poems and the prose being treated primarily as contributing to the thorough understanding of the major work.

30.109 Middle English Literature (Offered 1961-62, 1st sem.)

Course Content: This course is intended to acquaint the student with various stages and dialects of Middle English and to afford a background in depth for the study of Chaucer, Malory, and works of the early Renaissance. A variety of texts ranging in date from the twelfth to the sixteenth century will be read.

30.110 Shakespeare (Offered 1961-62, 2nd sem.)

Course Contents: A study of Shakespeare as an Elizabethan and of his world and his ideas as they find expression in his plays. A reading of ten selected plays not commonly included in undergraduate courses.

30.114 Major Modern Dramatists (Offered 1962-63, 2nd sem.)

Course Content: A study of the art and influence of Ibsen, Strindberg, Chekhov, Pirandello, Shaw, O'Casey, O'Neill, and Anderson upon the texture of modern drama.

30.120 Nineteenth and Twentieth Century European Fiction (Offered 1961-62, 2nd sem.)

Course Content: Novels and shorter narratives of such authors as Balzac, Flaubert, Dostoevsky, Mann, Kafka, and Camus will be discussed and reported on by means of seminar papers.

30.121 Principles of Literary Criticism

(Offered 1962-63, 1st sem.)

Course Content: An examination of the basic principles of literary criticism as they appear in the work of major critics of classical antiquity and of English literature from the Renaissance to the present. The lectures stress Plato, Aristotle, Longinus, Sidney, Dryden, Johnson, Coleridge, Hazlitt, Arnold, and T. S. Eliot. The readings include the work of important minor critics. Assigned papers require practical application of the principles of criticism.

30.129 Comparative Philology (Offered 1962-63, 1st sem.)

Course Content: This course will seek to acquaint the student with Latin and Greek as languages, especially as they contribute to English. No previous knowledge of Latin and Greek on the part of the student will be required.

30.132 Linguistics (Offered 1962-63, 2nd sem.)

Course Content: The aim of the course will be to acquaint the student with the more important principles of linguistics as a science. Phonetics, phonemics, and phonology will receive considerable attention, as will also patterning, process, meaning, and others of the larger aspects of language. The approach will be descriptive and comparative. Reference and collateral work will be necessary.

30.501 - 30.504 Thesis—Seminar (Offered yearly)

Course Content: The thesis is written under the direction of the department.

HISTORY

Admission

To be enrolled for graduate work in history, applicants must have obtained a bachelor's degree from a recognized institution with an undergraduate program which included at least fifteen semester hours of history.

THE MASTER'S DEGREE

Program

Each student will have a faculty advisor who will approve his program of study. A student may elect an option to write a thesis for six credits or complete six graduate courses with an R designation. The R designation after a course indicates that an extra assigned paper is required, and such work will be given one credit toward the six required in substitution for a thesis. The faculty advisor must approve the R courses which are to be taken.

The following courses must be taken by all students:

23.105	Intellectual History of Europe	2	23.115	Social and Economic History of Modern Europe	2
23.106	Intellectual History of Europe	2	23.116	Social and Economic History of Modern Europe ..	2
23.109	Seminar in Modern English History	2	23.118	Modern German History ..	2
23.112	History of France 1870 to Present	2	23.121	Seminar in Russian History	2

Eight semester hours of electives must be taken from other graduate courses or from appropriate advanced undergraduate courses approved by the faculty advisor. To obtain graduate credit in advanced undergraduate courses, a student must have a grade of A or B.

Comprehensive Examination

This examination will be held in accordance with the general Graduate School regulations.

Language Requirement

The language in which proficiency must be demonstrated in accordance with the general Graduate School regulations will be specified by the department.

THESIS SUBSTITUTION COURSES

Students who elect an option in assigned reading and reports instead of a thesis will be registered in any of the following courses:

23.105R	23.109R	23.115R	23.118R
23.106R	23.112R	23.116R	23.121R

The material covered in these courses is the same as for those without the R designation, but an assigned paper is required in addition to the regular work of the course. Three semester hours credit, which includes one semester hour credit toward the six required for this substitution, will be given in each case.

DESCRIPTION OF COURSES

23.100 Historiography (Offered yearly, 1st sem.)

Course Content: This course traces the development of historical writing from ancient times to the present. All the major historians are studied. Their styles, philosophies, methods of research and writing, as well as their accuracy in reporting, are analyzed. In addition, the varieties of source materials and the available bibliographies are examined. Students will be required to show ability in using the historical sources and constructing historical narratives by producing many written papers for this course.

23.105 Intellectual History of Europe (1600-1800) (Offered 1961-62, 1st sem.)

Course Content: The intellectual development of seventeenth and eighteenth century Europe, as a background to more recent thought, is the subject matter of this course. Political, scientific, and philosophic thought will be emphasized, though other aspects will be considered also. Theories of absolutism and popular sovereignty, Newtonian science, and the Age of Enlightenment will be developed in full.

23.106 Intellectual History of Europe (1800-1959) (Offered 1961-62, 2nd sem.)

Course Content: This course is a continuation of 23.105 and as such will receive basically the same emphasis. It will treat extensively the various socialist movements and their conservative counterparts; nonsocialist radical thought such as anarchism and nihilism; the growth of evolutionary theory; and the twentieth century phenomenon of totalitarianism.

23.109 Seminar in Modern English History (Offered 1961-62, 1st sem.)

Course Content: This seminar will deal with a fairly narrow span or topic in English history on a yearly basis. It will presuppose a basic knowledge of English history and will require extensive work on a term paper as well as assigned readings.

23.110 American Social History to 1820 (Offered 1961-62, 1st sem.)

Course Content: The ethnological foundation of American civilization, the ways Americans made their livings, the ways in which they lived, their religion, education, arts and amusements, are the main subjects of this course.

23.111 American Social History from 1820 (Offered 1961-62, 2nd sem.)

Course Content: The central theme in this course is the effect on American life of the great growth of industry, the unprecedented rise of science and invention, and the rapid increase of population in the nineteenth and twentieth centuries.

23.112 History of France (1870 to the present)

(Offered 1961-62, 2nd sem.)

Course Content: This course traces the development of the French nation from the Third Republic to the Fifth Republic. The problems growing out of the Franco-Prussian War; the causes and the results of World War I; the search for stability and justice in a period of social, political, and economic tension; the collapse of France in World War II; and the rise of a new France are all studied.

23.115 Social and Economic History of Europe (1600-1815)

(Offered 1962-63, 1st sem.)

Course Content: This course deals with the development of the social and economic institutions of modern Europe. Beginning with the rise of capitalism and the age of exploration, it traces the expansion of colonialism and mercantilism, and their effect upon the growth of nationalism. The social and economic institutions of the great empires of Spain, France, and England, as well as the effects of the French Revolution, receive serious emphasis.

23.116 Social and Economic History of Europe (1815-1959)

(Offered 1962-63, 2nd sem.)

Course Content: This course is a continuation of 23.115. The social and economic trends that began with the Age of Enlightenment and the French Revolution are studied. The expansion of capitalism and imperialism; the rise of national states in Europe; the development of socialistic philosophies; the implications of the scientific discoveries of Charles Darwin; the origins and consequences of the two world wars; and the contemporary conflict between capitalism and communism are all emphasized.

23.118 Modern German History (1870 to the present)

(Offered 1962-63, 2nd sem.)

Course Content: The importance of Germany in the late nineteenth and twentieth centuries will be explored in all its various facets. While the emphasis will be on internal development, Germany's relations with her neighbors and her aspirations for empire will, of necessity, receive adequate treatment.

23.121 Seminar in Russian History (Offered 1962-63, 1st sem.)

Course Content: This seminar will deal with a fairly narrow span or topic in Russian history on a yearly basis. It will presuppose a basic knowledge of Russian history and will require extensive work on a term paper as well as assigned readings.

23.501 - 23.504 Thesis—Seminar (Offered yearly)

Course Content: Thesis supervision by members of the department.

MATHEMATICS

Admission

To be enrolled for graduate work in mathematics, applicants must have obtained a bachelor's degree from a recognized institution with an undergraduate program which included nine semester hours of mathematics beyond integral calculus. If the mathematics which the student took did not include two semesters of advanced calculus, his first registration must be in 14.107 Advanced Calculus followed by 14.108 Advanced Calculus. These courses will count as graduate credits.

THE MASTER'S DEGREE

EVENING PART-TIME PROGRAM

Students may progress according to their abilities and the time available.

Required Courses:

14.241	Modern Algebra	2
14.242	Modern Algebra	2
14.320	Theory of Functions of a Complex Variable	2
14.321	Theory of Functions of a Complex Variable	2
14.323	Theory of Functions of a Real Variable	2
14.324	Theory of Functions of a Real Variable	2
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Elective Courses:

Eight semester hours must be elected from mathematics courses. Ten semester hours may be elected from any courses in engineering, mathematics, or physics for which the student has the necessary preparation.

DESCRIPTION OF COURSES

The following noncredit course is offered for those students whose undergraduate mathematical preparation is weak because they have not had differential equations or because they have been away from formal mathematical work for some time.

14.50 Introduction to Differential Equations

(Offered yearly, 1st and 2nd sem.)

Preparation: Differential and integral calculus

Course Content: Standard methods of solving ordinary differential equations; equations of first order and first degree; linear equations of higher order with constant co-efficients, method of undetermined co-efficients, variation of parameters; first-order equations of higher degree; special second-order equations with variable co-efficients.

GRADUATE COURSES

14.101 Advanced Mathematics

(Offered yearly, 1st and 2nd sem.)

Preparation: Differential equations

Course Content: Series solution of differential equations, Legendre and Bessel functions, Fourier series, orthogonal functions, Scalar and vector fields, gradient, divergence, and curl. Boundary value problems involving partial differential equations: wave equation, heat flow, Laplace equation.

14.102 Advanced Mathematics

(Offered yearly, 1st and 2nd sem.)

Preparation: 14.101 Advanced Mathematics or equivalent

Course Content: Matrix algebra, linear vector spaces, characteristic-value problems. Quadratic forms, transformations, discriminants and invariants, diagonalization of symmetric matrices. Characteristic numbers of nonsymmetric matrices, function space Sturm-Liouville problems. Application of the above methods of analysis to selected topics in calculus of variations, difference equations, and/or integral equations.

14.105 Advanced Mathematics (Offered yearly, 1st sem.)

(Open only to co-operative electrical engineering students)

Preparation: Differential equations

Course Content: Properties of series; absolute and uniform convergence; application of power series to solution of differential equations and approximation problems. Numerical analysis; solution of differential equations by Runge-Kutta method and by Taylor series, Sturm-Liouville systems, and orthogonal functions; Gram-Schmidt procedure; Fourier-Bessel and Legendre

series. Solution of partial differential equations of physics using above techniques.

14.106 Advanced Mathematics (Offered yearly, 1st sem.)
(Open only to co-operative engineering students)

Preparation: 14.105 Advanced Mathematics

Course Content: Linear vector spaces, matrices, linear transformations, orthogonal transformations, diagonalization of matrices, quadratic forms. Introduction to the mathematics of probability and statistics; discrete and continuous probability distributions, including binomial, Poisson, and normal.

14.107 Advanced Calculus (Offered yearly, 1st and 2nd sem.)

Preparation: Differential and integral calculus

Course Content: Functions of one real variable: limits, continuity, differentiability, the Riemann integral, mean-value theorems of both differential and integral calculus. Sequences, their limits and bounds. Functions of several variables; partial differentiation, especially for implicit and composite functions.

14.108 Advanced Calculus (Offered yearly, 1st and 2nd sem.)

Preparation: 14.107 Advanced Calculus

Course Content: Continued study of the calculus of functions of several variables. Extremal problems, transformations and mappings of coordinates, vector field theory, line and surface integrals. Improper integrals: gamma function, Laplace transform.

14.200 Numerical Analysis (Offered yearly, 2nd sem.)

Preparation: 14.201 Principles of Automatic Computation or knowledge of programming

Course Content: Numerical solution of linear and nonlinear systems of equations with aid of determinants, matrices. Newton's method, method of steepest descent, direct and inverse interpolation. Lagrange interpolation formula, Aitken's method, numerical differentiation and integration. Curve fitting by least squares with the use of orthogonal polynomials. Harmonic analysis. Each student will be expected to completely analyze, program, and run at least one major problem on the University digital computer.

14.201 Principles of Automation Computation
(Offered yearly, 1st sem.)

Preparation: Differential equations

Course Content: Description of computing processes and programming of digital computers. Basic concepts of computation on a stored program computer as well as a detailed study of the preparation of specific programs in machine language and problem oriented languages for the IBM 650 Computer. Introduction to automatic programming including interpretation and compilation. Binary, octal, and decimal number systems. Application of general purpose digital computers to numerical problems in mathematics and physics.

14.205 Difference Equations (Offered yearly, 2nd sem.)

Preparation: 14.108 Advanced Calculus or its equivalent or 14.102 Advanced Mathematics

Course Content: Formulation and solution of difference equations; approximate solution of engineering problems by finite-difference methods; relaxation techniques; stability and convergence of approximate methods. Applications to elastic systems, electrical networks, filters, potential theory, wave propagation, heat flow, etc.

14.220 Statistics (Offered yearly, 2nd sem.)

Preparation: 14.230 Probability

Course Content: Fundamental statistical methods. Tests of significance and estimation based on large or small samples; simple correlation and linear regression; introduction to analysis of variance and sequential analysis. Application to quality control and other engineering problems.

14.230 Probability (Offered yearly, 1st sem.)

Preparation: Differential and integral calculus

Course Content: Permutations and combinations; addition and multiplication theorems including Bayes' theorem. Discrete and continuous probability distributions including binomial, Poisson, and normal with applications.

14.241 Modern Algebra (Offered yearly, 1st sem.)

Preparation: 14.108 Advanced Calculus or its equivalent or 14.102 Advanced Mathematics

Course Content: Introduction to the general algebraic properties of groups, rings, ideals, fields, and algebras.

14.242 Modern Algebra (Offered yearly, 2nd sem.)

Preparation: 14.241 Modern Algebra

Course Content: Properties of general fields; Galois fields, abstract vector spaces. General linear transformations; matrices and their properties; diagonalization and inversion of matrices. Application to solution of algebraic equations, ordinary differential equations, boundary value problems, and integral equations.

14.300 Fourier Series and Boundary Value Problems

(Offered 1961-62, 2nd sem.)

Preparation: 14.108 Advanced Calculus or its equivalent or 14.102 Advanced Mathematics

Course Content: A problem course dealing with the application of trigonometric series and integrals and related forms to differential equations and boundary value problems.

14.310 Vector Analysis (Offered 1961-62, 1st sem.)

Preparation: 14.108 Advanced Calculus or its equivalent or 14.102 Advanced Mathematics

Course Content: The theory and method of vector analysis as applied in physics and applied mathematics.

14.320 Theory of Functions of a Complex Variable

(Offered yearly, 1st sem.)

Preparation: 14.108 Advanced Calculus or its equivalent or 14.102 Advanced Mathematics

Course Content: The general theory of functions of a complex variable, Cauchy's theorem. Taylor's and Laurent's series, the theory of residues, conformal mapping, the Schwartz-Christoffel transformation.

14.321 Theory of Functions of a Complex Variable

(Offered yearly, 2nd sem.)

Preparation: 14.320 Theory of Functions of a Complex Variable

Course Content: This course continues 14.320 and extends the development of the general theory of functions of a complex variable to more advanced topics. Application of the theory to physical and engineering problems.

14.323 Theory of Functions of a Real Variable

(Offered yearly, 1st sem.)

Preparation: 14.242 Modern Algebra or 14.321 Theory of Functions of a Complex Variable

Course Content: Theory of sets, metric spaces and applications to the topology of the real line and Euclidean N -space, closed and open sets, continuous and uniformly continuous functions. Connected, totally bounded, and compact sets. Heine-Borel theorem, extension theorems for continuous functions and applications to integration theory.

14.324 Theory of Functions of a Real Variable

(Offered yearly, 2nd sem.)

Preparation: 14.323 Theory of Functions of a Real Variable

Course Content: Integration theory on abstract measure spaces and its specialization to Lebesgue theory on the real line Outer measure, signed measure, measurable functions. Lebesgue convergence theorem, Radon-Nikodym theorem, product measures, and Fubini's theorem. Vitali coverings, Lebesgue Stieltjes integral, and applications to probability theory.

14.340 Calculus of Variations (Offered 1961-62, 2nd sem.)

Preparation: 14.108 Advanced Calculus or its equivalent or 14.102 Advanced Mathematics

Course Content: The minima of simple integrals in nonparametric form in three-space. Necessary and sufficient conditions for a minimum, fields, the Hamilton-Jacobi theory.

14.530 Partial Differential Equations

(Offered 1962-63, 2nd sem.)

Preparation: 14.108 Advanced Calculus or its equivalent or 14.102 Advanced Mathematics

Course Content: Types of equations which are widely used in engineering. The vibrating string, Laplace's equation, the flow of heat. Fourier series and integrals, Bessel and Legendre functions, orthogonal functions.

14.540 Nonlinear Differential Equations

(Offered 1962-63, 1st sem.)

Preparation: 14.108 Advanced Calculus or its equivalent or 14.102 Advanced Mathematics

Course Content: The topological methods of Poincaré, the work of van der Pol. Oscillations, nonlinear resonance, and other applications.

14.550 Integral Equations (Offered 1962-63, 1st sem.)

Preparation: 14.108 Advanced Calculus or its equivalent or 14.102 Advanced Mathematics

Course Content: Linear integral equations, eigen-value theory, relation to infinite systems and differential equations, applications in mechanics and physics.

14.600 Differential Geometry (Offered 1961-62, 1st sem.)

Preparation: 14.108 Advanced Calculus or its equivalent or 14.102 Advanced Mathematics

Course Content: Differential properties of space curves, developable surfaces, curved surfaces, and systems of curves on surfaces.

14.700 Topology (Offered 1962-63, 2nd sem.)

Preparation: 14.324 Theory of Functions of a Real Variable

Course Content: A survey of the fundamental problems of topology, that branch of geometry which studies those properties of geometric figures which remain invariant under bicontinuous transformations, and a discussion of its significance to most fields of modern mathematics. Detailed study of metric and general topological spaces with application to real variables, differential equations; fundamental theorem of algebra.

P H Y S I C S

Admission

To be enrolled for graduate work in physics, applicants must have obtained a bachelor's degree from a recognized institution with an undergraduate program which included twelve semester hours of physics, including modern physics, and mathematics through differential equations.

THE MASTER'S DEGREE

Program

Each student will have a faculty advisor who will approve his program of study. Certain senior undergraduate courses may be required if the student's background requires such work.

A thesis option for which credits will be arranged is available for students pursuing the program on a full-time basis.

The program may be completed on an evening part-time basis, and the students may progress according to their ability and time available.

REQUIRED COURSES

15.101	Theoretical Physics (Theoretical Mechanics)	2
15.102	Theoretical Physics (Electromagnetic Theory I)	2
15.111	Mathematical Physics	2
15.112	Mathematical Physics	2
15.301	Quantum Theory	2
15.302	Quantum Theory	2
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ELECTIVE COURSES

Six semester hours must be elected from physics courses with numbers of 300 or greater. Twelve semester hours may be elected from any courses in engineering, mathematics or physics for which the student has the necessary preparation.

THE DOCTOR'S DEGREE

Qualifying Examination

The qualifying examination for the Ph.D. degree is taken normally at the end of the third semester of graduate study. If any part of the examination is failed, it may be repeated with the permission of the department. On the basis of the qualifying examination, a student may be admitted to candidacy for the Ph.D. degree.

Language Requirements

The languages in which proficiency must be demonstrated in accordance with the general Graduate School regulations will be specified by the department.

Comprehensive Examination

The comprehensive examination will be given no earlier than one year after the degree candidacy has been established and no later than six months before the commencement at which the degree is to be awarded.

Thesis

After degree candidacy has been established, arrangements for a thesis advisor must be completed. A thesis committee will also be appointed by the chairman of the department. This committee will be kept informed concerning the progress of the thesis and will approve the thesis in its final form.

Final Oral Examination

This examination will be held in accordance with the Graduate School regulations.

DESCRIPTION OF COURSES

15.101 Theoretical Physics (Theoretical Mechanics)

(Offered yearly, 1st and 2nd sem.)

Preparation: Admission to science or engineering graduate program

Course Content: Newton's laws of motion. D'Alembert principle. Lagrange's equations. Hamilton's principle. Central forces. Motion of rigid bodies.

15.102 Theoretical Physics (Electromagnetic Theory I)

(Offered yearly, 1st and 2nd sem.)

Preparation: Admission to science or engineering graduate program

Course Content: Electrostatic field and potentials. Multipole expansions. The static magnetic field. Stationary current problems. Fields in material media. Two and three dimensional boundary value problems. Maxwell equations.

15.103 Theoretical Mechanics (Offered yearly, 2nd sem.)

Preparation: 15.101 Theoretical Physics

Course Content: Hamilton's equations; principle of least action. Canonical transformations. Hamilton-Jacobi theory. Classical perturbation theory.

15.104 Electromagnetic Theory II (Offered yearly, 2nd sem.)

Preparation: 15.102 Theoretical Physics

Course Content: Maxwell equations. Scalar and vector potentials. Energy and momentum of the electromagnetic field. Boundary conditions, plane waves and spherical waves. Scattering and radiation of electromagnetic waves. Fourier analysis.

15.105 Advanced Physics (Offered yearly, 2nd sem.)

(Open only to co-operative electrical engineering students)

Preparation: 14.106 Advanced Mathematics

Course Content: Selected topics of theoretical physics of special interest to electrical engineers. Emphasis is placed on electrostatics and wave propagation.

15.106 Theoretical Physics (Offered yearly, 1st and 2nd sem.)

Preparation: Admission to science or engineering graduate program

Course Content: This course supplements the work of 15.101 and 15.102, Theoretical Physics, with application of the basic concepts of physics to the fields not covered there, such as Thermodynamics, Statistical Mechanics, Hydrodynamics, and if time permits, the extension of these concepts to the more recent fields.

15.107 Electromagnetic Theory III (Offered yearly, 1st sem.)

Preparation: 15.104 Electromagnetic Theory II

Course Content: Selected topics in electromagnetic theory: relativistic electromagnetic theory, wave guide problems, propagation, scattering.

15.109 Statistical Mechanics (Offered yearly, 1st sem.)

Preparation: Admission to science or engineering graduate program

Course Content: A discussion and development of laws of classical mechanics when the initial state of the system under consideration cannot be specified with the accuracy that would be theoretically desired. Development of the laws of thermodynamics from this point of view. Discussion of Maxwell, Boltzmann, Fermi-Dirac, Bose-Einstein statistics.

15.111 Mathematical Physics I
(Offered yearly, 1st and 2nd sem.)

Preparation: 15.101 Theoretical Physics and 15.102 Theoretical Physics

Course Content: An introduction to the mathematical methods of theoretical physics. Complex variables. Calculus of residues. Conformal mapping series and integral transform solutions of ordinary differential equations.

15.112 Mathematical Physics II
(Offered yearly, 1st and 2nd sem.)

Preparation: 15.101 Theoretical Physics and 15.102 Theoretical Physics

Course Content: Boundary value problems. Eigen-functions and their uses. Green's functions. Partial differential equations of physics.

15.201 Introductory Modern Physics (Offered yearly, 1st sem.)
(May not be used for credit toward the degree requirements of the program in physics)

Preparation: Admission to science or engineering graduate program

Course Content: A study of the physical discoveries made since 1900. Introduction to special relativity. The discovery of the electron; its emission from matter. The origins of quantum theory. The nuclear atom and the Bohr theory of hydrogen and its spectrum. Atomic structure and optical spectra. Schrodinger's wave mechanics.

15.202 Introductory Modern Physics (Offered yearly, 2nd sem.)
(May not be used for credit toward the degree requirements of the program in physics)

Preparation: 15.201 Introductory Modern Physics

Course Content: A continuation of the first semester. X-rays. The atomic nucleus. Natural radioactivity. Isotopes. Artificial radioactivity. The neutron, the proton, the positron. Particle accelerators, nuclear reactions, nuclear forces, fission and fusion. Cosmic rays and fundamental particles.

15.203 Introductory Nuclear Physics (Offered yearly, 1st sem.)

Preparation: Admission to science or engineering graduate program

Course Content: Basic description of nuclei; radioactivity. The detection of nuclear radiation. Particle accelerators. Nuclear masses and other properties of nuclei.

15.204 Introductory Nuclear Physics (Offered yearly, 2nd sem.)

Preparation: 15.203 Introductory Nuclear Physics

Course Content: Nuclear models. Magnetic and electric moments of nuclei. Nuclear transitions. Nuclear reactions. Fission. High energy physics.

15.205 Introductory Solid State Physics

(Offered yearly, 1st sem.)

Preparation: 15.101 Theoretical Physics and 15.102 Theoretical Physics*Course Content:* An introduction to the electrical and magnetic properties of solids.**15.206 Introductory Solid State Physics**

(Offered yearly, 2nd sem.)

Preparation: 15.205 Introductory Solid State Physics*Course Content:* Optical and thermal properties of solids.**15.207 Introduction to the Theory of Relativity**

(Offered 1962-63, 2nd sem.)

Preparation: 15.101 Theoretical Physics and 15.102 Theoretical Physics*Course Content:* Failure of classical mechanics and description of critical experiments. Principles of equivalence. Lorenz transformations. Relativistic mechanics. Relativistic electrodynamics. Radiation theory.**15.301 Quantum Theory I** (Offered yearly, 1st sem.)*Preparation:* 15.101 Theoretical Physics and 15.102 Theoretical Physics*Course Content:* Experimental basis. Schroedinger equation and probability interpretation. Wave brackets. Uncertainty principle. One-dimensional problems.**15.302 Quantum Theory II** (Offered yearly, 2nd sem.)*Preparation:* 15.301 Quantum Theory I*Course Content:* Operator and nonoperator methods for harmonic oscillator. Angular momentum. Central force problems. Perturbation theory.**15.303 Quantum Theory III** (Offered 1962-63, 1st sem.)*Preparation:* 15.302 Quantum Theory II*Course Content:* Scattering theory. Formal development. Many particle systems. Spin. Addition of angular momenta.**15.304 Quantum Theory IV** (Offered 1962-63, 2nd sem.)*Preparation:* 15.303 Quantum Theory III*Course Content:* Symmetry properties. Klein-Gordon equation. Dirac equations.**15.307 Quantum Theory of Fields I** (Offered 1961-62, 1st sem.)*Preparation:* Four semesters of quantum mechanics*Course Content:* Dirac electron theory. The radiation field. Second quantization. Positron theory.**15.308 Quantum Theory of Fields II**

(Offered 1961-62, 2nd sem.)

Preparation: 15.307 Quantum Theory of Fields I*Course Content:* Coupled fields. Relativistic scattering theory. Radiative correction to hyperfine structure. Lamb shift.

15.309 Theoretical Nuclear Physics I

(Offered 1962-63, 1st sem.)

Preparation: 15.303 Quantum Theory II*Course Content:* Experimental background. Two body problems. Light nuclei; heavy nuclei.**15.310 Theoretical Nuclear Physics II**

(Offered 1962-63, 2nd sem.)

Preparation: 15.309 Theoretical Nuclear Physics I*Course Content:* Interaction with the electromagnetic field. Nuclear reactions. Elementary particles.**15.311 Advanced Solid State Physics I**

(Offered 1962-63, 1st sem.)

Preparation: 15.302 Quantum Theory I*Course Content:* Selected topics in the quantum theory of solids. The band theory of metals.**15.312 Advanced Solid State Physics II**

(Offered 1962-63, 2nd sem.)

Preparation: 15.311 Advanced Solid State Physics I*Course Content:* Semiconduction and ionic crystals. The electric, magnetic, and thermal properties of matter.**15.401 Semiconductor Physics (Offered yearly, 1st sem.)***Preparation:* Admission to science or engineering graduate program*Course Content:* A study of the mechanisms of conduction in solids, excess electrons and holes as current carriers, n-type and p-type semiconductors, p-n junctions, rectifiers, and transistors. Comparison of metals, insulators, and semiconductors from an introductory quantum viewpoint. Considerations of surface states, crystal growth, and the effect of imperfections in crystals.**15.402 Semiconductor Physics (Offered yearly, 2nd sem.)***Preparation:* 15.401 Semiconductor Physics*Course Content:* Studies of electrical and physical properties of semiconductors, thermoelectricity, resistivity, mobility, and lifetimes of current carriers. Hall Effect, conversion of solar energy, photoelectric effects, surface effects. Scattering, diffusion, structure of p-n junctions, transistor and rectifier theory. Basic theories of wave mechanics, statistical mechanics, and band structure applied to semiconductors.**15.403 Plasma Physics I (Offered 1962-63, 1st sem.)***Preparation:* 15.102 Theoretical Physics*Course Content:* Motion of charged particles in electromagnetic fields. Boltzmann equation for plasmas. Fundamentals of magneto-hydro-dynamics. Applications to include mirror geometry, high frequency confinement, plasma confinement and heating by means of magnetic fields, motion of plasmas along and across magnetic field lines.

15.404 Plasma Physics II (Offered 1962-63, 2nd sem.)

Preparation: 15.403 Plasma Physics I

Course Content: Plasma oscillations; waves in magneto plasmas. Dispersion relations. Fokker-Plank equations for plasmas; plasma conductivity; runaway electrons; relaxation times; radiation phenomena in magneto plasmas; stability theories; relativistic plasmas.

15.405 Upper Atmospheric Physics (Offered 1962-63, 2nd sem.)

Preparation: 15.102 Theoretical Physics and 15.403 Plasma Physics I

Course Content: Mathematical formulation of idealized equilibrium atmospheres. Geoelectric and geomagnetic fields. Physics of the ionosphere. Solar and cosmic radiation. Meteor physics. Theoretical and experimental examinations of current space technology problems.

15.501 - 15.502 Thesis—Seminar (Offered yearly)

Course Content: Experimental and theoretical work for master's degree.

15.503 - 15.504 Seminar (Offered yearly)

Preparation: Admission to the Ph.D. program

Course Content: Discussion of selected topics in advanced physics.

15.505 - 15.506 Thesis (Offered yearly)

Preparation: Admission to the Ph.D. program

Course Content: Experimental and theoretical work for Ph.D. candidates.

POLITICAL SCIENCE

Admission

To be enrolled for graduate work in political science, applicants must have obtained a bachelor's degree from a recognized institution with an undergraduate program which included at least fifteen semester hours of political science.

THE MASTER'S DEGREE

Program

Each student will have a faculty advisor who will approve his program of study. A student may elect an option to write a thesis for six credits or complete six graduate courses with an R designation. The R designation after a course indicates that an extra assigned paper is required, and such work will be given one credit toward the six required in substitution for a thesis. The faculty advisor must approve the R courses which are to be taken.

The following courses must be taken by all students:

22.131	Recent Political Theory ..	2	22.190	Comparative Political	
22.151	Federal Legislative			Parties	2
	Process	2	22.200	Seminar in Public	
22.160	Federal Administrative			Administration	2
	Process and Public Policy	2	22.231	Seminar in U. S. Foreign	
22.171	U. S. Soviet Relations	2		Policy	2
22.180	Nationalism	2			

Eight semester hours of electives must be taken from other graduate courses or from appropriate advanced undergraduate courses approved by the faculty advisor. To obtain graduate credit in advanced undergraduate courses, a student must have a grade of A or B.

Comprehensive Examination

This examination will be held in accordance with the general Graduate School regulations.

THESIS SUBSTITUTION COURSES

Students who elect an option in assigned reading and reports instead of a thesis will be registered in any of the following courses:

22.131R	22.160R	22.180R	22.200R
22.151R	22.171R	22.190R	22.231R

The material covered in these courses is the same as for those without the R designation, but an assigned paper is required in addition to the regular work of the course. Three semester hours credit, which includes one semester hour credit toward the six required for this substitution, will be given in each case.

DESCRIPTION OF COURSES

22.131 Recent Political Theory (Offered 1961-62, 1st sem.)

Course Content: An examination of ideas from the time of the French and American revolutions to the present, with special emphasis upon the impact of economic and technical change in the nineteenth and twentieth centuries on the course of Western political thought.

22.151 Federal Legislative Process (Offered 1962-63, 1st sem.)

Course Content: A study of Congress and the effect on Federal legislation of the activities of the administrative and judicial branches with particular stress on Congressional-Presidential relations.

22.160 Federal Administrative Process and Public Policy (Offered 1962-63, 2nd sem.)

Course Content: An examination of the processes of policy execution in the Federal government with focus on the role of the President.

22.171 United States-Soviet Relations (Offered 1961-62, 1st sem.)

Course Content: A study of the relations between the United States and the Soviet Union from 1917 to the present. Such topics as the Soviet political system, the "non-recognition" period, and the origins and nature of the present power conflict are stressed.

22.180 Nationalism (Offered 1961-62, 2nd sem.)

Course Content: An examination of the evolution and role of nationalism in contemporary international relations. Representative nationalistic movements and theories are covered.

22.186 Problems in American Civil Liberties (Offered 1961-62, 2nd sem.)

Course Content: A study of selected issues of American civil liberties and rights. Stress will be given to contemporary problems such as freedom of speech, press, religion, and other matters within the purview of the Bill of Rights.

22.190 Comparative Political Parties (Offered 1962-63, 2nd sem.)

Course Content: A comparative study of the background, organization, and function of political parties in contemporary democratic governments. The role and influence of two-party and multi-party systems in the democratic process are considered.

22.200 Seminar in Public Administration

(Offered 1961-62, 2nd sem.)

Course Content: A study of selected problems in public administration at all levels, with special attention to state and local processes.

22.231 Seminar in United States Foreign Policy

(Offered 1962-63, 1st sem.)

Course Content: An examination of the role of the United States in world politics. Historical background, analysis of problems involved in policy formulation and execution, and specific contemporary issues are covered.

22.501 - 22.504 Thesis—Seminar (Offered yearly)

Course Content: Thesis supervision by individual members of the department.

PSYCHOLOGY

Admission

To be enrolled for graduate work in psychology, applicants must have obtained a bachelor's degree from a recognized institution with an undergraduate program which included at least fifteen semester hours of psychology.

THE MASTER'S DEGREE

Program

Each student will have a faculty advisor who will approve his program of study. A thesis is required for six semester hours credit. Arrangements for the thesis advisor will be made by the head of the department.

The following courses must be taken by all students:

25.101	Statistics in Psychology	2	25.111	Advanced Experimental Psychology	2
25.104	The Nature of Motivation	2	25.112	Advanced Experimental Psychology	2
25.105	Learning	2	25.121	Tests and Test Procedures	2
25.108	Personality Theory	2	25.130	History of Psychology	2

Eight semester hours of electives must be taken from other graduate courses or from appropriate advanced undergraduate courses approved by the faculty advisor. To obtain graduate credit in advanced undergraduate courses, a student must have a grade of A or B.

Language Requirement

The language in which proficiency must be demonstrated in accordance with the general Graduate School regulations will be specified by the department.

DESCRIPTION OF COURSES

25.101 Statistics in Psychology (Offered 1962-63, 1st sem.)

Preparation: A basic course in statistics through simple analysis of variance

Course Content: This course is concerned with some of the more complex quantitative methods available for the analysis of psychological data. Such topics as tests of significance, multiple and partial correlation, complex analysis of variance, covariance, sampling techniques, and nonparametric methods will be considered.

25.104 The Nature of Motivation (Offered 1962-63, 2nd sem.)

Course Content: This course is concerned with the nature and determinants of motivation, the instigators of thought and action. Dealing with both animal and human motives, but centering mainly upon the latter, the basic theories as well as relevant experimental evidence and methodological problems will be considered. Members of the class will participate in the presentation of material.

25.105 Learning (Offered 1961-62, 1st sem.)

Course Content: This course is concerned with the factors involved in human and animal learning. Various theoretical approaches will be discussed, and a major emphasis will be placed upon relevant experimental findings. Such topics as conditioning, problem solving, transfer, acquisition of skills, and retention will be considered.

25.108 Personality Theory (Offered 1961-62, 2nd sem.)

Course Content: This course is concerned with a study of the various theories which have made important contributions to an understanding of the human personality. Emphasis will be placed upon those theories which have evolved since 1900, but some attention will be given to prior contributory influences. Readings from original sources will supplement class work.

25.111 Advanced Experimental Psychology (Offered 1962-63, 1st sem.)

Course Content: Students will carry out and report on experiments in a variety of areas of behavior. Such areas as psychophysics (vision and audition), preception, cognitive processes, and learning will be treated.

25.112 Advanced Experimental Psychology (Offered 1962-63, 2nd sem.)

Preparation: 25.111 Advanced Experimental Psychology

Course Content: Students will design, carry out, and report on several original experiments in areas of their choosing. Problems of experimental design and methodology will be considered.

25.121 Tests and Test Procedures (Offered 1961-62, 1st sem.)

Preparation: A basic course in statistics

Course Content: This course offers a survey of the various kinds of psychological tests currently available. A number of representative, widely used tests will be considered intensively. Principles of test construction will be dealt with, accompanied by practice in the construction of a "new" test. Specific topics include assessment of validity and reliability, establishment of norms, and item analysis.

25.130 The History of Psychology (Offered 1961-62, 2nd sem.)

Course Content: This course attempts to evaluate modern psychology in the light of its historical origins. The historical background provided by philosophy, as well as by the physical, social, and medical sciences, will be considered in detail. Members of the class will participate in the presentation of the material.

25.151 - 25.154 Thesis—Seminar (Offered yearly)

Course Content: Experimental work under the direction of the department.



Business Administration Programs

INFORMATION APPLYING TO BUSINESS ADMINISTRATION PROGRAMS

Business administration in a complex economy requires the inter-relationship of many specialized areas. The function of the administrator is largely one of coordinating through effective policy the contributions of many specialized skills. In developing the graduate program, the thoughts expressed by successful business executives as to what is most effective in the development of those who assume managerial responsibilities have been studied. In addition, consideration has been given to reports of graduate studies in business administration as to the fundamental material which should be covered.

Course descriptions are given in order that prospective students may obtain a view of the type of material discussed. The course offerings are arranged in such a manner that students may make continuous progress toward the degree.

The number of students enrolled in each class will be limited to permit effective teaching at the graduate level, and the University reserves the right to cancel any course for which an insufficient number of students apply.

All courses carry two semester hours of credit unless specified otherwise.

The Master of Business Administration program at present is offered for part-time students, and therefore, the classes are given in the late afternoon and evening. The curriculum is described on the following pages. All part-time students must register in the Graduate School and present a transcript of undergraduate record at that time.

A circular describing the courses to be offered during the first semester and giving the registration and interview dates is issued in July. A similar circular for the second semester is issued in December, and for the summer session one is issued in May.

ACADEMIC CALENDAR**May 1961 - June 1962****SUMMER SESSION 1961**

Interview and Registration Period	Wednesday-Saturday	May 31-June 10
Classes Begin	Monday	June 12
Independence Day, No Classes	Tuesday	July 4
Classes End	Tuesday	Aug. 1
Examination Period	Wednesday-Thursday	Aug. 2-Aug. 3

FIRST SEMESTER 1961-1962

Registration Period for Former Students	Wednesday-Saturday	July 5-Sept. 16
Interview and Registration Period for New Students	Monday-Saturday	Aug. 21-Sept. 16
Labor Day, Office Closed	Monday	Sept. 4
Classes Begin	Monday	Sept. 18
Columbus Day, No Classes	Thursday	Oct. 12
Veterans' Day, No Classes	Saturday	Nov. 11
Thanksgiving Vacation	One Week	Nov. 20-Nov. 24
Classes Resume	Monday	Nov. 27
Christmas Vacation	Two Weeks	Dec. 19-Jan. 1
Classes Resume	Tuesday	Jan. 2
Classes End	Friday	Jan. 19
Examination Period	Monday-Friday	Jan. 22-Jan. 26
No Classes	Monday-Friday	Jan. 29-Feb. 2

SECOND SEMESTER 1961-1962

Registration Period for Former Students	Tuesday-Saturday	Jan. 2-Feb. 3
Interview and Registration Period for New Students	Monday-Saturday	Jan. 15-Feb. 3
Classes Begin	Monday	Feb. 5
Washington's Birthday, No Classes	Thursday	Feb. 22
Patriots' Day, No Classes	Thursday	April 19
Classes End	Friday	May 18
Make-up for Classes Missed		
Thurs., April 19	Thursday	May 24
Memorial Day, No Classes	Wednesday	May 30
Examination Period	Monday-Friday	May 28-June 1

COMMITTEE ON GRADUATE STUDY IN BUSINESS ADMINISTRATION

MYRON J. SPENCER, A.B., M.A., *Chairman*

Director of Graduate Study in Business and Professor of Economics

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Assistant Professor of Marketing

CHARLES H. DUFTON, A.B., M.A.

Professor of Marketing and Advertising and Chairman of the Department

JOSEPH M. GOLEMME, S.B., M.A., C.P.A.

Professor of Accounting and Chairman of the Department

ROGER S. HAMILTON, A.B., M.A., Ph.D.

Dean of Business Administration

LYMAN A. KEITH, B.S., M.A., M.B.A.

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Assistant Professor of Marketing and Advertising

ANGHEL N. RUGINA, B.S., M.A., Ph.D.

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Dean of the Graduate School and Professor of Chemistry

WILLIAM C. WHITE, S.B., Ed.M., Eng.D.

Vice President and Provost of the University

EDWARD R. WILLETT, B.S., M.A., Ph.D.

Professor of Finance and Chairman of the Department

TEACHING STAFF

ANKER V. ANDERSEN	<i>Assistant Professor of Finance, Northeastern University</i>
JOHN W. BAGWILL, JR.	<i>Staff Assistant, Planning, Raytheon Company</i>
CLIFFORD A. BEAN	<i>Market Analyst, Raytheon Company</i>
NEIL H. BORDEN, JR.	<i>Assistant Professor of Marketing, Northeastern University</i>
JOSEPH CONNOLLY	<i>Sales Manager, Hickok Manufacturing Co.</i>
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JOHN J. GRAHAM	<i>Attorney at Law</i>
A. DOUGLAS GREEN	<i>Industrial Consultant</i>
SIDNEY HERMAN	<i>Assistant Professor of Economics, Northeastern University</i>
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RUDOLPH A. JOHNSON	<i>Babson Institute of Business Administration</i>
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ROBERT J. KROOSS	<i>Industrial Engineer, Gillette Safety Razor Co.</i>
CHUNG-WEN KWANG	<i>Associate Professor of Economics and Accounting, Northeastern University</i>
DAVID J. LOSCHKY	<i>Graduate Student, Graduate School of Arts and Sciences, Harvard University</i>
IVORY L. LYONS	<i>Assistant Professor of Economics, Northeastern University</i>
LAWRENCE H. MALCHMAN	<i>Associate Professor of Accounting, Northeastern University</i>
JOHN E. MARSHALL	<i>Babson Institute of Business Administration</i>

A. HOWARD MYERS	<i>Associate Professor of Industrial Relations, Northeastern University</i>
JOSEPH P. NATHANSON	<i>Teacher of Mathematics, Newton Public Schools</i>
WILLIAM C. NEMITZ, JR.	<i>Manager, Manufacturing Planning, Westinghouse Electric Corporation</i>
PAUL NORTON	<i>Industrial Consultant</i>
ANGHEL N. RUGINA	<i>Associate Professor of Economics and Finance, Northeastern University</i>
HARRY A. SAUNDERS	<i>Securities Broker-Dealer Representative, Hooper-Kimball, Inc.</i>
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ALBERT SLAVIN	<i>Assistant Professor of Accounting, Northeastern University</i>
FRANK TURGEON	<i>Investment Counselor</i>
LESLIE E. WOODS	<i>Labor Advisor and Consultant, Raytheon Company</i>

MASTER OF BUSINESS ADMINISTRATION DEGREE

ADMISSION

To be enrolled for graduate work in business administration, applicants must have obtained a bachelor's degree from a recognized institution. In addition, all applicants are required to take the Admission Test for Graduate Study in Business administered by the Educational Testing Service. This test is designed to measure aptitude for graduate study in business and is not a measure of knowledge in specific subjects. No special preparation is required, and there is no passing or failing score on the test. The test is given at local universities, and arrangements are made directly by the applicant with the Educational Testing Service. The results of this test must be on file by the end of the first semester of a student's registration.

PROGRAM

Each applicant must be interviewed by the Director of the Graduate Business Administration Program. At this time he will be notified which of the required courses of Group I must be in his program. The choice will be determined by work done previously in the areas indicated. Such courses must be completed before other required courses are taken and will carry graduate credit.

In addition to the Group I courses required, each student must take the required courses of Group II which will total twenty semester hours. Ten semester hours of work must also be taken from elective courses.

REQUIRED COURSES — GROUP I

14.151	Mathematics and Statistics for Business Administration I	20.158	Economics of the Firm
14.152	Mathematics and Statistics for Business Administration II	41.101	Managerial Accounting
20.157	Aggregative Economics	45.103	Industrial Technology

REQUIRED COURSES — GROUP II

41.234	Control	43.214	Marketing II
42.231	Human Relations in Business Organizations I	44.209	Finance I
42.232	Human Relations in Business Organizations II	44.210	Finance II
43.213	Marketing I	45.205	Manufacturing I
		45.206	Manufacturing II
		50.206	Administrative Processes

FUNCTIONAL ELECTIVE COURSES**Finance**

- 44.212 Investment Management
44.215 Financial Policy

Marketing

- 43.205 Marketing Policy
43.241 Advertising Management
43.242 Marketing Research

Manufacturing

- 45.221 Manufacturing Policy I
45.222 Manufacturing Policy II

Human Relations

- 42.215 Industrial Relations

GENERAL ELECTIVE COURSES

- 20.103 Managerial Economics
20.202 Case Studies in Business
Enterprise
20.204 Government and Business
20.206 Economic Development
20.208 International Economic
Relations

- 20.211 Business Cycles and
Forecasting
45.208 Management of Small
Enterprises
46.103 Business Law I
46.104 Business Law II

DESCRIPTION OF COURSES

REQUIRED COURSES—GROUP I

14.151 Mathematics and Statistics for Business Administration I (Offered yearly, 1st sem.)

Course Content: An introduction to some of the modern concepts of mathematics such as linear programming, theory of games, probability, vectors and matrices. While primarily a mathematics course, applications will be made to business administration and the social sciences, particularly economics.

14.152 Mathematics and Statistics for Business Administration II (Offered yearly, 2nd sem.)

Preparation: 14.151 Mathematics and Statistics for Business Administration I

Course Content: This course is devoted to a general survey of quantitative methods in business and economics. Topics include the principles and application of correlation, regression, time series analysis, and index numbers.

20.157 Aggregative Economics (Offered yearly, 1st sem.)

Course Content: Macro-economic analysis, the structure of national income accounts; underlying determinants of aggregate economic activity; recent theoretical models of disequilibrium, growth and fluctuations; employment and wage levels.

20.158 Economics of the Firm (Offered yearly, 2nd sem.)

Course Content: Behavior of the individual firm from the economist's point of view; demand, cost, seller's competition, market equilibrium and value concepts.

41.101 Managerial Accounting (Offered yearly, 1st and 2nd sem.)

Course Content: This course is designed to acquaint the student with the interrelationship of accounting, controlling, and reporting for the industrial and commercial enterprise. Greater emphasis is placed upon the result of general and corporate accounting procedures rather than the procedures themselves. The origin and background of financial statements and budgets are considered to develop a better understanding of management's search into the qualitative aspect of accounting with respect to the management process.

45.103 Elements of Industrial Management (Offered yearly, 1st and 2nd sem.)

Course Content: Subjects treated include product engineering and design, production planning and control, time and motion study, certain aspects of wage and salary administration, design of manufacturing processes and plant location and layout. Emphasis will be placed on the problems involved in administration of these activities. The course makes use of technical notes, case problems, and text material to provide the student with basic knowledge and tools available for reaching administrative decisions on technological aspects of industrial problems.

REQUIRED COURSES—GROUP II**41.234 Control** (Offered yearly, 1st and 2nd sem.)

Course Content: An indispensable tool for better managerial control is the establishment and operation of budgets. Requisites to successful budgeting and essential steps in budgetary control with the procedures for carrying out budget policies will be studied. Controllership—the accounting and statistical function of business—is concerned with the responsibility of providing “fact-finding” information for top management in decision-making. The work of the controller in obtaining and organizing the necessary data for managerial utilization will be an essential part of the course.

42.231 Human Relations in Business Organizations I
(Offered yearly, 1st sem.)

Course Content: The basic purpose is to give the student an opportunity to develop a way of thinking about human behavior in organizations that will enable him to play an effective administrative role.

The usual setting for administrative activity includes powerful social and psychological forces governing behavior. Administrators must think clearly in the face of changing situations in which they are involved both as individuals with personal needs and as major determinants of the satisfaction of others.

Classroom and written work focuses on the analysis and discussion of concrete case situations describing the behavior of individuals and groups in various work settings. The case work is supplemented by readings that introduce the student to concepts developed by researchers, teachers, and practitioners in the field of business administration with respect to human relations in industry.

42.232 Human Relations in Business Organizations II
(Offered yearly, 2nd sem.)

Preparation: 42.231 Human Relations in Business Organizations I

Course Content: A continuation of 42.231 Human Relations in Business Organizations I with emphasis on analysis of individual behavior. The objective is to give the student an opportunity to improve his skill in understanding others as well as his ability to communicate.

43.213 Marketing I (Offered yearly, 1st and 2nd sem.)

Course Content: The objectives of this course are twofold: to provide the student with a broad but comprehensive understanding of basic marketing functions, institutions, and policies, and to develop the student's ability to recognize and deal with marketing problems. Particular attention is placed on defining the role of marketing in the economy as well as in the business firm. The course requires that marketing situations be examined from the marketing practitioner's point of view involving analysis, decision, and programs of action. Sections of the course cover the consumer, both ultimate and industrial, product policy, channels of distribution, and pricing. Atten-

tion is also given to advertising, personal selling, marketing research, and integrated sales programs.

43.214 Marketing II (Offered yearly, 2nd sem.)

Preparation: 43.213 Marketing I

Course Content: Continuation of 43.213 Marketing I.

44.209 Finance I (Offered yearly, 1st and 2nd sem.)

Course Content: A study of the methods of selection and development of the optimum financial structure for the business firm, including financial activation of the organization and efficient maintenance of its operation; sources of initial as well as of operating capital; dividend policy and dividend payment procedure; organization for finance, including capital budgeting, tax planning, long-range fiscal planning; financing for reorganization, merger, and liquidation; international aspects of financial control; analysis of financial statements and the significance of operating ratios.

44.210 Finance II (Offered yearly, 2nd sem.)

Preparation: 44.209 Finance I

Course Content: A continuation of 44.209 Finance I.

45.205 Manufacturing I (Offered yearly, 1st and 2nd sem.)

Course Content: This course approaches the problems of manufacturing operations as experienced on the plant manager level. Reflecting the various elements involved in production planning and control, it is concerned with the economics of production when considering the aspects of specialization, simplification, standardization, and diversification as well as expansion, contraction, or integration. It includes such aspects of production as materials, plant location and layout, power maintenance, labor supply, organization, wage policy, etc., and concludes with cases considering the controls of the manufacturing processes, i.e., product development, scheduling, inventory, quality, cost, and budgetary controls.

45.206 Manufacturing II (Offered yearly, 2nd sem.)

Preparation: 45.203 Manufacturing I

Course Content: A continuation of 45.203 Manufacturing I.

50.206 Administrative Processes
(Offered yearly, 1st and 2nd sem.)

Preparation: 44.209, 44.210 Finance I and II; 45.203, 45.204 Manufacturing I and II; 43.213, 43.214 Marketing I and II

Course Content: This course is concerned, at the top management level, with the problems involved in the organizational and structural processes related to administrative and organizational operation. It presents an integrated approach to the policy and planning function as it cuts across departmental lines of control. Advantages and disadvantages of various types of organization are explored and discussed in terms of optimum values involved.

FUNCTIONAL ELECTIVE COURSES

Each student must take ten semester hour credits from among the elective courses with a maximum of six from any single functional elective group.

FINANCE

44.212 Investment Management (Offered yearly, 2nd sem.)

Course Content: This course reviews investment objectives and discusses various methods of building an investment portfolio to achieve given objectives.

Emphasis will be placed on those aspects of security market operation which will be useful to the businessman and which will furnish background for those who may be interested in the brokerage business.

44.215 Financial Policy (Offered yearly, 1st and 2nd sem.)

Preparation: 44.209 and 44.210 Finance I and II

Course Content: Considers the technique of decision-making affecting the specific functions of financial management. An intensive analysis of business cases involving, among others, major financial policy issues including: design of the capital structure; cost of capital; capital budgeting and return on investment; sources of short-term, long-term, and equity capital; valuation associated with mergers and consolidation; and financial problems arising from reorganization.

The impact of cyclical fluctuations on the functions of financial management will be considered specifically in regard to the timing aspect of corporate financing. Financial policy issues are considered as an integral part of the major policies of the business firm as an operating entity.

MANUFACTURING

45.221 Manufacturing Policy I (Offered 1962-63, 1st sem.)

Course Content: Top management consideration of the responsibilities and function in organizing for, planning, and controlling the procedures of production. The course considers the modern tendencies of industrial development, specifically integration, concentration, consolidation, specialization, standardization, and diversification. It includes a study of the consumptive demand to determine markets and what to manufacture; factors affecting the industrial site, such as accessibility to raw materials, adequate labor supply, transportation service and costs; plan and design, construction and layout for effective production flow; selection of equipment; the coordination of output with demand; seasonal production; production planning; inventory control; quality control; procurement; cost control; methods of compensation of labor.

45.222 Manufacturing Policy II (Offered 1962-63, 2nd sem.)

Preparation: 45.221 Manufacturing Policy I

Course Content: A continuation of 45.221 Manufacturing Policy I.

MARKETING**43.205 Marketing Policy** (Offered yearly, 1st and 2nd sem.)

Preparation: 43.214 Marketing II

Course Content: Based upon a management point of view, this course is decision-oriented and analytical. It sets forth a definite way of looking at current developments in marketing management and marketing practice. Recent developments in the behavioral sciences, mainly economics, psychology, and sociology, are related to responsibilities of marketing management.

43.241 Advertising Management (Offered yearly, 1st sem.)

Preparation: 43.214 Marketing II

Course Content: This course deals primarily with the formulation of advertising policy and programs from a top management point of view. Emphasis is placed on determining the "mix" of marketing elements, with emphasis on advertising, that satisfies the particular situations of various businesses. The objective of the course is not to train advertising technicians; rather it is to give a viewpoint and training to those who may be required to formulate, administer, or evaluate advertising and marketing programs. Course work consists of readings, text material, and case discussions. Both industrial and consumer goods advertising are covered.

43.242 Marketing Research (Offered yearly, 2nd sem.)

Preparation: 43.214 Marketing II

Course Content: The art of scientific investigation is applied to typical marketing problems such as product research, advertising, and sales control. A step-by-step procedure for defining a problem and carrying out the research necessary for its solution is developed. Special emphasis is given to motivation research and operations research techniques developed by social scientists and mathematicians for the solution of marketing problems.

HUMAN RELATIONS**42.215 Industrial Relations** (Offered yearly, 1st and 2nd sem.)

Course Content: A study of managerial practice and policy relative to the recognition and solution of problems pertaining to employer-employee relations in industry; effective handling of controversial questions between management and the union, including contract negotiation, grievance procedure, and arbitration; communication between management, the union, and the rank and file; wage policies, including job evaluation, incentives, income security benefit plans, and labor costs; labor productivity; the problems of government controls in industrial relations; and the responsibilities of management and labor in a modern economy.

GENERAL**20.103 Managerial Economics** (Offered yearly, 1st and 2nd sem.)

Course Content: An intensive analysis of the business firm with respect to demand, cost, capital, capital budgeting, and the implications of varying market structures for price-output relationships.

20.202 Case Studies in Business Enterprise
(Offered yearly, 1st sem.)

Course Content: A survey of the history of industrial endeavor and business activity from its rudimentary stages to the present day, with careful attention to the evolution of business management, noting successful and unsuccessful examples by case history; discussion of the role that business plays in shaping our economy and society as well as the effect of our social and economic order upon the business firm; special emphasis is given to the control of business by the state, monetary policies, public finance, the rise of banks, corporations, commodity and stock exchanges, and their regulation and control.

20.204 Government and Business (Offered yearly, 1st sem.)

Course Content: The expanding scope of the government's economic and social activities is bringing about a much closer relationship between government and business. The course analyzes the role of government as a regulating force as well as the nature and impact of governmental fiscal, economic, and social policies upon the conduct of business. The political and economic philosophies behind greater government participation in the economic structure of the nation, as indicated by public utility, anti-trust, and labor and social legislation; the responsibilities accruing to government as the result of its participation in the regulation and shaping of our economic endeavor, i.e., high level production, stabilized employment and worker's income, housing, foreign policy, and industrial mobilization. Case studies and analyses of the legislative framework within which government participation in the economic structure is set make up the background of the course.

20.206 Economic Development (Offered 1962-63, 2nd sem.)

Course Content: This course deals with the enumeration, delineation and assessment of variables which determine the level and the nature of economic activity.

An introductory discussion of the economic factor in civilization is followed by an examination of the psychological, social and political influences on economic change. The role of various economic institutions in secular development is analyzed.

20.208 International Economic Relations
(Offered yearly, 2nd sem.)

Course Content: The course will deal with two major areas: the rudiments of international economics and a survey of current problems in international relations. The topics in the first area include: theory of international trade;

balance of payment problems; tariff policy and multilateral trade; capital movements. The topics in the second area include: problems of industrial countries versus undeveloped countries; institutions of international economic cooperation such as International Monetary Fund, World Bank, and Common Markets. Not recommended for those who have had a good course in international trade.

20.211 Business Cycles and Forecasting (Offered yearly, 1st sem.)

Course Content: The major business cycle theories are introduced together with a survey of the statistical history of fluctuations in business activity with particular reference to capitalism in the United States. Heavy emphasis on the techniques and weaknesses of forecasting; its importance to the economy, specific industries, and the individual firm.

45.208 Management of Small Enterprises (Offered yearly, 1st and 2nd sem.)

Course Content: Analysis of all phases of operation of a small business, including selection of field or product, organizing, financing and setting up a small business, sales strategy, credit operations, cash flows, cost controls, and profit planning, primarily through discussion of small business organization cases.

46.103 Business Law I (Offered yearly, 1st sem.)

Preparation: At least one year of business law or equivalent

Course Content: An analytical study of the "Uniform Commercial Code" (now in effect in Massachusetts and five other states) which contains many changes in the legal rules affecting Negotiable Instruments, Sales of Goods, Bills of Lading, Warehouse Receipts, and other phases of business transactions.

46.104 Business Law II (Offered yearly, 2nd sem.)

Preparation: At least one year of business law or equivalent

Course Content: This course deals with several phases of business law not ordinarily covered in undergraduate courses. Topics covered include Real Property, Personal Property, Rights and Remedies of Creditors, Contract Restrictions and Restrictive Covenants, Business Torts, Business Crimes, and a survey of Federal regulation of business by administrative agencies such as the Federal Trade Commission, Interstate Commerce Commission, Securities and Exchange Commission, and the Federal Communications Commission.



Education Programs

INFORMATION APPLYING TO EDUCATION PROGRAMS

A full-time graduate program in education is available for those who wish to obtain a Master of Education degree. To be admitted to full-time study, candidates must submit an application by April 1 to be approved for first semester enrollment and by November 1 for second semester enrollment. In addition, interviews are required with the Director of Graduate Education Programs and two other staff members.

Applicants who wish to be certified for public school teaching will be expected to do student teaching before the degree of Master of Education is awarded unless evidence of certification for public school teaching is submitted.

A late afternoon and evening program is available for those who wish to obtain the Master of Education degree by part-time study. All part-time students must have an interview with the Director of Graduate Education Programs at the time of their first registration.

Students in any program who are graduates of colleges which are not members of a regional association will be expected to take the Graduate Record Examination and submit evidence of general qualifications before being admitted to degree candidacy.

Specialized programs are offered in school administration, school guidance, special education and school psychology. In addition, a general program is available which allows the student to take a high concentration of liberal arts work.

The number of students enrolled in each class will be limited to permit effective teaching at the graduate level, and the University reserves the right to cancel any course for which an insufficient number of students apply.

The number of semester hours of credit for a course varies and is indicated after each course description.

A circular describing the courses offered during the first semester and giving the registration and interview dates is issued in August. A similar circular for the second semester is issued in December, and for the summer session one is issued in May.

ACADEMIC CALENDAR**May 1961 - June 1962****SUMMER SESSION 1961**

Interview and Registration Period	Monday-Saturday	June 12-June 24
Classes Begin	Monday	June 26
Independence Day, No Classes	Tuesday	July 4
Classes End	Friday	July 28
Examination Period	Monday-Friday	July 31-Aug. 4

FIRST SEMESTER 1961-1962

Interview and Registration Period	Wednesday-Saturday	Sept. 6-Sept. 16
Classes Begin	Monday	Sept. 18
Columbus Day, No Classes	Thursday	Oct. 12
Veterans' Day, No Classes	Saturday	Nov. 11
Thanksgiving Vacation	One Week	Nov. 20-Nov. 25
Classes Resume	Monday	Nov. 27
Christmas Vacation	Two Weeks	Dec. 19-Jan. 1
Classes Resume	Tuesday	Jan. 2
Classes End	Saturday	Jan. 20
Examination Period	Monday-Saturday	Jan. 22-Jan. 27
No Classes	Monday-Saturday	Jan. 29-Feb. 3

SECOND SEMESTER 1961-1962

Registration Period for Former Students	Tuesday-Saturday	Jan. 2-Feb. 3
Interview and Registration Period for New Students	Monday-Saturday	Jan. 22-Feb. 3
Classes Begin	Monday	Feb. 5
Washington's Birthday, No Classes	Thursday	Feb. 22
Spring Vacation	One Week	April 16-April 21
Classes Resume	Monday	April 23
Classes End	Saturday	May 26
Memorial Day, No Classes	Wednesday	May 30
Examination Period	Monday-Saturday	May 28-June 2

COMMITTEE ON GRADUATE STUDY IN EDUCATION

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CHARLES F. HALEY, B.S., Ed.M.

Assistant Professor of Education

FRANK E. MARSH, JR., A.B., Ed.M., Ed.D.

Associate Professor of Education

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Dean of the Graduate School and Professor of Chemistry

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Vice President and Provost of the University

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THOMAS J. CAVANAGH	<i>Assistant Dean of Education, Northeastern University</i>
EDWARD B. COLBERT	<i>Director of Guidance, Watertown Public Schools</i>
DAVID R. COOK	<i>Assistant Professor of Education and Counselor in Testing and Counseling Center, Northeastern University</i>
ANTHONY J. DAMPLO	<i>Director of Elementary Schools, Natick</i>
HOPE F. DANIELSON	<i>Assistant Professor of Education, Northeastern University</i>
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WILLIAM J. GOLDMAN	<i>Director of Special Education, Fitchburg State College</i>
CHARLES F. HALEY	<i>Assistant Professor of Education, Northeastern University</i>
RICHARD W. HUBBARD	<i>Chairman, Mathematics Department, Newton South High School</i>
LEOTA L. JANKE	<i>Associate Professor of Education, Northeastern University</i>
ALBERT W. KOCH	<i>Audiologist and Speech Pathologist, Winthrop Foundation, Massachusetts Eye and Ear Infirmary</i>
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GUY A. PETRALIA	<i>Vice Principal, Arlington High School</i>
WILLIAM A. PHILBRICK, JR.	<i>Supervisor of Special Handicapped and Hard of Hearing Children, Massachusetts Department of Education</i>

GUSTAV S. ROOK	<i>Professor of Graphic Science, Northeastern University</i>
GERSHEN ROSENBLUM	<i>Chief Psychologist, South Shore Guidance Center</i>
DONALD K. TUCKER	<i>Assistant Director of Testing and Counseling, Northeastern University</i>
ANNA F. WALSH	<i>School Psychologist and Special Class Teacher, Andover Public Schools</i>
E. DAVIS WOODBURY	<i>Superintendent of Schools, Milton</i>
HAROLD S. ZAMANSKY	<i>Assistant Professor of Psychology, Northeastern University</i>

GRADUATE PROGRAMS

Liberal Arts and Specialized Programs

ADMISSION

To be enrolled for graduate work in the liberal arts and specialized programs, applicants must have obtained a bachelor's degree from a recognized institution.

GENERAL REQUIREMENTS

All students are required to complete the following courses:

21.306	Advanced Psychology of Learning and Thinking	3
21.340	Research Methods in Education	3
21.401	Social Foundations of Education	3
21.402	Social Foundations of Education	3
		12

PROFESSIONAL CORE COURSES

In addition to the general requirements, the individual specialized programs require the following courses:

School Administration:

21.201	Fund. of Administration I	3
21.202	Fund. of Administration II	3
		6

School Guidance:

21.371	Fund. of Guidance I	3
21.372	Fund. of Guidance II	3
		6

Special Education and School Psychology:

21.351	Sp. Ed. of Excep. Children I	3
21.352	Sp. Ed. of Excep. Children II	3
		6

Liberal Arts Emphasis:

21.475	History of Educational Thought I	3
21.476	History of Educational Thought II	3
		6

PROFESSIONAL ELECTIVES

The program with liberal arts emphasis does not require any professional course electives. Twelve semester hours may be taken from courses offered in the Arts and Sciences Programs.

In each specialized program eight semester hours of professional courses must be elected. The remaining four semester hours may be from professional or liberal arts courses given by the Arts and Sciences programs. The following preferred electives are recommended in the specialized programs:

School Administration:

21.205	Admin. of the School Unit I	2
21.206	Admin. of the School Unit II	2
21.216	Super. of Instr. in the Sec. School	2
or		
21.217	Super. of Instr. in the El. School	2
21.304	Mental Health	2
21.422	American Gov. and Ed.	2

School Guidance:

21.304	Mental Health	2
21.322	Tests and Measurements	2
21.323	Meas. of Intelligence	2
21.324	Adv. Meas. of Intelligence	2
21.373	Occupational Information	2
21.374	Counseling	2

Special Education:

21.323	Meas. of Intelligence	2
21.324	Adv. Meas. of Intelligence	2
21.355	An. of Read. Disabilities	2
21.357	Teaching the Slow Learner	2
21.358	Teaching the Gifted Child	2

School Psychology:

21.307	Abnormal Psychology I	2
21.308	Abnormal Psychology II	2
21.320	Statistics	2
21.322	Tests and Measurements	2
21.323	Meas. of Intelligence	2
21.324	Adv. Meas. of Intelligence	2

FIELD EXPERIENCE

In addition to the required and elective courses, the programs in school guidance, special education, and school psychology require field experience to make a total of 34 semester hours of credit as follows:

School Guidance:

21.375	Field Experience in Guidance	4
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Special Education:

21.345	Field Experience in Special Education	4
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School Psychology:

21.325	Field Experience in Psychology	4
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Fifth-Year Program

ADMISSION

To be enrolled for graduate work in the fifth-year program in education, applicants must have obtained a bachelor's degree from a recognized institution. For those who wish to obtain teacher certification in the Commonwealth of Massachusetts, the state requirements are given below.

TEACHER CERTIFICATION REQUIREMENTS

The teacher certificate requirements of the Commonwealth of Massachusetts are as follows. Students meeting these requirements can obtain provisional certification in the other northeastern states.

ELEMENTARY SCHOOL TEACHER

Kindergarten through Grade VIII

1. A bachelor's degree or a diploma from a four-year course in a normal school approved by the Board of Education.
2. Included in each candidate's program of preparation, there shall be a minimum of eighteen semester hours in education courses approved for the preparation of elementary school teachers, with not less than two semester hours in supervised student teaching in the elementary grades. The remaining semester hours shall include courses covering two or more of the following areas:

Educational Psychology, including Child Growth and Development
Philosophy of Education

Methods and Materials in Elementary Education

Curriculum Development in Elementary Education

SECONDARY SCHOOL TEACHER

Junior High School Teacher

1. A bachelor's degree or a diploma from a four-year course in a normal school approved by the Board of Education.
2. Included in each candidate's program of preparation, there shall be a minimum of twelve semester hours in education courses approved for the preparation of secondary school teachers, with not less than two semester hours in supervised student teaching in the secondary

schools. The remaining semester hours in secondary education shall include appropriate courses in two or more of the following areas:

Educational Psychology, including Adolescent Growth and Development

Philosophy of Education

Methods and Materials in Secondary Education

Curriculum Development in Secondary Education

3. At least eighteen semester hours of preparation at the college level in the major subject field or fields, and nine semester hours in the minor subject field or fields.

STUDENT TEACHING REQUIREMENTS

1. The prerequisite courses for starting practice teaching are:

ELEMENTARY TEACHING

21.220 Principles of Teaching

21.301 Child Psychology

Two specialized methods courses

21.305 Psychology of Learning and Thinking

or

21.306 Advanced Psychology of Learning and Thinking

SECONDARY TEACHING

21.220 Principles of Teaching

21.303 Adolescent Psychology

21.305 Psychology of Learning and Thinking

or

21.306 Advanced Psychology of Learning and Thinking

One specialized methods course

2. Applications for student teaching must be filed by April 1 for assignments in the fall semester and by November 1 for assignments in the spring semester.

3. All placements are made by the Director of Student Teaching. Students are not permitted to make any independent arrangements with school systems.

4. Student teachers must complete 15 consecutive weeks of full-time experience in a public school.

GENERAL REQUIREMENTS

Programs for certification in elementary and secondary education are available for students who wish to obtain a Master of Education degree and also complete the above professional requirements. These programs require 34 semester hours of credit, of which six must be

practice teaching. If certification is not desired, a course may be substituted for student teaching to make a total of thirty credits.

All students must take the following courses:

21.220	Principles of Teaching	3
21.230	Student Teaching with Related Seminar	6
21.306	Advanced Psychology of Learning and Thinking	3
21.340	Research Methods in Education	3
21.401	Social Foundations of Education	3
21.402	Social Foundations of Education	3
		21

ADDITIONAL REQUIREMENTS

In addition to the required courses, the following courses are required depending upon the field in which the student wishes to major:

Elementary Teaching:

21.212	Curric. of the Amer. Elem. School	3
21.301	Child Psychology	2
	Four courses in specialized methods	8
		13

Secondary Teaching:

21.210	Curric. of the Amer. Sec. School	3
21.303	Adoles. Psychology	2
21.322	Tests and Measurements	2
	At least one course in specialized methods	2
	At least two electives	4
		13

DESCRIPTION OF COURSES

21.200 Fundamentals of Administration (Offered summer, 1962)

Course Content: A combination of courses 21.201 and 21.202.

Credit: 6 semester hours

21.201 Fundamentals of Administration I

(Offered yearly, 1st sem.)

Course Content: Designed for those planning to enter administration as well as teachers, principals, and school administrators, this course offers a thorough discussion and analysis of modern administrative practices. Local, state, and federal relationships in the structure of American education; the expanding role of the administrator; supervision and the improvement of instruction; and the field of special school services will be included.

Credit: 3 semester hours

21.202 Fundamentals of Administration II

(Offered yearly, 2nd sem.)

Course Content: Problems associated with the planning, construction, and operation of the school plant; financing education; business management; and the increasingly important area of public relations will be considered. The course should be of particular interest and value to teachers and administrators who are concerned with improving professional competence and promoting effective teamwork in the administration of a school system.

Credit: 3 semester hours

21.205 Administration of the School Unit I

(Offered 1962-63, 1st sem.)

Course Content: The school principalship will be placed in focus as a key position in public education. Among other points of emphasis involving the complex role of the principal will be the development of competencies in building management, the analysis and improvement of the educational program, and the selection and development of personnel. The course will be of sufficient breadth to be of assistance to teachers as well as those presently serving in the fields of administration and supervision.

Credit: 2 semester hours

21.206 Administration of the School Unit II

(Offered 1962-63, 2nd sem.)

Course Content: The total responsibilities associated with school principalships will be considered in this course. Administrative principles applying to both the elementary and secondary levels will be discussed. Special emphasis will be placed on meeting the educational needs, guidance, curriculum evaluation and revision, business management, extracurricular activities, administering the school plant, and interpreting the school program to the community. The course is designed to serve those preparing to become principals as well as to guide administrators in the field.

Credit: 2 semester hours

21.208 Administration of the School Unit

(Offered summer, 1961)

Course Content: A combination of courses 21.205 and 21.206.*Credit:* 4 semester hours**21.210 Curriculum of the American Secondary School**

(Offered yearly, 2nd sem., and summer, 1961)

Course Content: This course is designed for in-service and prospective teachers, principals, and supervisors who seek experience and assistance in dealing with such problems as the following: improving and enriching the subject curriculum; developing a core curriculum; general and special education; planning integrated units of work; providing for skill learning in an experience curriculum; co-operative development of criteria for curriculum evaluation; and effective use of evaluative criteria for secondary schools.*Credit:* 3 semester hours**21.212 Curriculum of the American Elementary School**

(Offered yearly, 2nd sem., and summer, 1962)

Course Content: Consideration will be given to actual teaching situations as they exist in the modern elementary classroom, and emphasis will be placed on specific situations contributing to effective learning, sound curriculum-building, and evaluation. This course is open to teachers, supervisors, principals, and others interested in the modern elementary school program.*Credit:* 3 semester hours**21.216 Supervision in the Secondary School**

(Offered 1962-63, 1st sem.)

Course Content: This course is designed to meet the needs of those teachers seeking to prepare themselves for supervisory responsibilities as well as supervisors and administrators desiring to improve themselves. Major topics to be discussed are: the relationship between administrators and supervisors; the leadership role and responsibilities of the supervisor; mutual responsibilities between supervisor and faculty; personnel problems; discipline in the supervisory picture; types of supervision; relationship with other supervisors; curriculum improvement; teacher evaluation and professional guidance; and the psychological impact of supervision on the total educational framework and school administration.*Credit:* 2 semester hours**21.217 Supervision in the Elementary School**

(Offered 1961-62, 2nd sem.)

Course Content: This course will deal with the leadership role of the elementary school principal in the supervision of the instructional program. How the principal can work with individual teachers and with groups of teachers to improve instructional methods and to develop curriculum content will be basic to the course. Consideration will be given also to the involvement of lay people in curriculum development. The course is intended for principals, beginning principals, and teachers who are planning to go into supervisory work.*Credit:* 2 semester hours

21.220 Principles of Teaching

(Offered yearly, 1st and 2nd sem., and summer)

Course Content: An exploration of the factors involved in effective teaching. Emphasizes the basic need for understanding of the learner and the learning process. Considers the improved methods of organization and evaluation in modern instructional programs.

Credit: 3 semester hours

21.230 Student Teaching with Related Seminar

(Offered yearly, 1st and 2nd sem.)

Preparation: See requirements under Graduate School Regulations.

Course Content: Here the student is provided opportunity in a public school to assume responsibility for organizing learning experiences in his major area under expert supervision. Separate seminars for elementary and secondary majors meeting weekly will run concurrently with the student teaching period and deal with problems encountered in the classroom.

Credit: 6 semester hours

21.241 Mathematics at the Elementary Level I

(Offered yearly, 1st sem.)

Course Content: This course is designed to strengthen the elementary classroom teacher's understanding and appreciation of arithmetic. Special emphasis will be placed upon our decimal system of notation, meanings, relationships, and processes of the fundamental operations as well as problem analysis and estimation. At the same time, consideration will be given to the meaningful approach of teaching arithmetic to elementary school pupils and the methods involved.

Credit: 2 semester hours

21.242 Mathematics at the Elementary Level II

(Offered yearly, 2nd sem.)

Course Content: A continuation of the study of elementary arithmetic, its meaning and practice, embracing problem-solving techniques and applying them to fundamentals of whole numbers, common and decimal fractions, per cent, scaling and graphing, and measurements. Consideration will be given to topics and materials which serve to challenge the more able and ambitious pupils.

Credit: 2 semester hours

21.245 The Teaching of High School Science I

(Offered yearly, 1st sem.)

Course Content: The first half of a two-semester course, principally for secondary school teachers. Problems of observations of scientific facts, their discovery, the derivation of scientific principles from elaboration of hypotheses, experimentation and reasoning with these facts will be analyzed in terms of the learning processes. The different fields of science will be considered, stressing especially their interdependence and their unity of methods and of

reasoning. Stress will be laid on recent advances in science and their relation to older discoveries. Particular attention will be paid to the background knowledge and preparation of the secondary school science teacher.

Credit: 2 semester hours

21.246 The Teaching of High School Science II
(Offered yearly, 2nd sem.)

Course Content: A continuation of 21.245. During the second half of the course plans for modern science courses in various fields will be elaborated.

Credit: 2 semester hours

21.248 Workshop in Elementary Science
(Offered summer, 1962)

Course Content: Attention will be given to ways teachers may bring to their classrooms simple and effective projects, materials, and experiments in the various phases of science such as machines, weather, solar system, etc. Consideration will be given to field trips and other devices to strengthen the total integrated program at the elementary level.

Credit: 2 semester hours

21.249 The Teaching of Social Studies
(Offered yearly, 1st sem.)

Course Content: A study of developments in methods, materials, and curriculum. Consideration will be given to such topics as the following: the teacher of the social studies; objectives of social studies instruction; social studies programs; controversial issues; current events; visual and auditory aids; field trips; evaluation. These and others will be studied in their relation to the experiences and interests of the members of the class. Particular emphasis on the role of the social studies in education for citizenship.

Credit: 2 semester hours

21.250 Workshop in Play Production (Offered summer, 1962)

Course Content: A laboratory course designed to aid the public school teacher in selecting and preparing a play for production. Major topics to be discussed will be: the role of the director as a co-ordinator of activities; the responsibility of the director to analyze, block, design and rehearse the play; and the responsibility of the director to supervise the commercial aspects of dramatic activity.

Credit: 2 semester hours

21.251 The Teaching of Language Arts in the Elementary School
(Offered yearly, 1st sem.)

Course Content: Emphasis will be given to best ways to meet the general objectives of the four basic communication skills—reading, writing, speaking, and listening—and how each relates to the other in the development of children.

Credit: 2 semester hours

21.252 The Teaching of Reading in the Elementary School
(Offered yearly, 2nd sem.)

Course Content: This course will deal with factors which must be considered in the preparation of teachers of reading. Topics to be discussed will include important changes in the teaching of reading (methods and materials) and reasons for the changes. Reading readiness—what it is, and factors to be considered. Levels of instruction—how to plan a reading program for any grade.

Credit: 2 semester hours

21.253 The Teaching of Oral and Written Expression in the Secondary School (Offered yearly, 1st sem.)

Course Content: For teachers of all subjects. Classroom procedures to motivate pride in our mother tongue. Methods of attaining skill in the important language conventions and in stimulating creative thinking. Discussion of problems of speaking and oral reading; of teaching straight thinking; of growing sentences; of vocabulary; of spelling; of punctuation. Reexamination and redirection of teaching methods.

Credit: 2 semester hours

21.254 The Teaching of Reading and Literature in the Secondary School (Offered yearly, 2nd sem.)

Course Content: For all secondary school teachers. Study of improvement of reading speed and comprehension by revised study habits, proper motivation, diagnostic tests, and appropriate materials. Surveys and discussions of developmental reading programs. Methods effective in intensive and extensive reading. Criteria for choosing literature and teacher qualifications essential to its effective presentation. Special suggestions in the teaching of fiction, drama, poetry, nonfiction, and creative listening.

Credit: 2 semester hours

21.255 The Teaching of Modern Languages in the Secondary School (Offered 1961-62, 1st sem.)

Course Content: This course intends to explore the degree to which educational theory and psychology of learning can be adapted to the teaching situation existing today in our complex public school organization. Through the workshop method and group discussions, the most effective types of class activities, subject unit presentation, assignments, examinations, teaching aids, etc., will be considered. The needs and problems of the members of the class will determine the content and progress of the course.

Credit: 2 semester hours

21.261 The Teaching of General Business Subjects
(Offered 1961-62, 1st sem.)

Course Content: This course investigates current trends in the teaching of social business subjects, such as general business, economics, economic geog-

raphy, business law, and consumer education. Objectives, nature of subject matter, teaching aids and devices, tests and measurements, textbooks, and supplementary materials are studied.

Credit: 2 semester hours

21.271 Technical Drawing and Descriptive Geometry (Offered yearly, 1st sem.)

Course Content: The course will develop the general principles underlying Multi-View Representation using the Direct Method and show applicability to all types of views (principal, auxiliary, oblique). The concepts of descriptive geometry dealing with space angularity, perpendicularity, parallelism, intersection, and skewness between lines, surfaces, and solids will be correlated with their pictorial and multi-view representations. Applications of these concepts to more general treatments of sections and intersections; surface developments; axonometric, oblique, and perspective pictorials; shades and shadows; as well as problems dealing with space vector systems; topographic layouts, etc., will be included. The major aim of the course will be toward placing the construction, analysis, reading, and visualization of three-dimensional concepts on a foundation of logic and reason.

Credit: 2 semester hours

21.272 Advanced Graphics (Offered yearly, 2nd sem.)

Course Content: The course will develop methods by which the theorems and constructive techniques of plane, solid, and descriptive geometry may be applied in graphically representing, analyzing, and solving problems having mathematical or scientific implications. The following topics will be developed to a depth commensurate with the mathematical and scientific background of the participants: (a) basic geometric constructions (exact and approximate) involving lines, curves, and polygons; (b) graphical equivalents to mathematical operations in arithmetic, algebra, trigonometry, analytic geometry, and calculus; (c) graphical analysis of curves having scientific applications (conic sections, involutes, roulettes, periodic functions, etc.); (d) design, construction, and application of charts (bar, rectilinear, logarithmic, polar, tri-linear, etc.) for the presentation and analysis of empirical data; (e) vector geometry solutions involving displacements, velocities, accelerations, forces, relative motions, etc.; (f) elements of nomography, topographic mapping as well as spatial relationship problems of mathematical or scientific origin.

Credit: 2 semester hours

21.273 Illinois Mathematics for Junior High and Senior High School Teachers I (Offered 1961-62, 1st sem.)

Course Content: The first semester of a two-semester course for teachers of junior high and senior high school mathematics. This course will be a detailed study of the first two units of the University of Illinois Committee on School Mathematics (UICSM).

Credit: 2 semester hours

21.274 Illinois Mathematics for Junior High and Senior High School Teachers II (Offered 1961-62, 2nd sem.)

Preparation: 21.273 Illinois Mathematics for Junior High and Senior High School Teachers I.

Course Content: This course is a continuation of 21.273 and deals with a detailed study of units three and four of the UICSM.

Credit: 2 semester hours

21.275 Yale Mathematics for Junior High School Teachers I
(Offered yearly, 1st sem.)

Course Content: A study of the method of teaching mathematics developed by the School Mathematics Study Group of Yale University (MSG) for the junior high school grades.

Credit: 2 semester hours

21.276 Yale Mathematics for Junior High School Teachers II
(Offered yearly, 2nd sem.)

Preparation: 21.275 Yale Mathematics for Junior High School Teachers I.

Course Content: A continuation of 21.275 to complete the junior high school mathematics units of the MSG.

Credit: 2 semester hours

21.277 Yale Mathematics for Senior High School Teachers I
(Offered yearly, 1st sem.)

Course Content: A study of the methods of teaching mathematics developed by the School Mathematics Study Group of Yale University (MSG) for the senior high school grades.

Credit: 2 semester hours

21.278 Yale Mathematics for Senior High School Teachers II
(Offered yearly, 2nd sem.)

Preparation: 21.277 Yale Mathematics for Senior High School Teachers I

Course Content: A continuation of 21.277 to complete senior high school mathematics units of the MSG.

Credit: 2 semester hours

21.301 Child Psychology (Offered yearly, 1st sem.)

Course Content: A study is made of the child as he develops from infancy through the elementary school years. The primary emphasis is upon his emotional, social, and intellectual development. Physical development is discussed only in its relation to these other factors. The child is considered in his home and peer environment as well as in the school environment. Case history

material is studied. Some attention is paid to the theoretical formulations of child behavior.

Credit: 2 semester hours

21.303 Adolescent Psychology

(Offered yearly, 2nd sem. and summer)

Course Content: Social, emotional, and intellectual development is traced through the junior and senior high school years. Problems in family relationships and in the adolescent's social environment are considered as well as his adjustment in school. Case history material is included.

Credit: 2 semester hours

21.304 Mental Health (Offered yearly, 2nd sem.)

Course Content: This course will study conditions leading to the most effective social adjustment. Consideration will be given to the relationship between the maturation process and mental health, the predeterminants of maladjustment and its prevention, and will place special stress on those factors that encourage the attainment of emotional maturity. Some time will be given to a study of community mental health programs. Information bearing on mental health from the fields of psychiatry, psychology, sociology, physiology, and medicine will be synthesized and evaluated. This course should be of interest to teachers, personnel and guidance workers, psychologists, social workers, rehabilitation therapists, and other groups.

Credit: 2 semester hours

21.305 Psychology of Learning and Thinking

(Offered yearly, 1st and 2nd sem., and summer)

Course Content: This course is designed to introduce the public school teacher and the educational administrator to the more important psychological principles and processes involved in effective learning and thinking. Consideration is given to such topics as productive thinking, kinds of learning, the role of organizational factors in effective learning, problem-solving behavior, and concept formation.

Credit: 2 semester hours

21.306 Advanced Psychology of Learning and Thinking

(Offered yearly, 1st and 2nd sem., and summer)

Preparation: 21.305 Psychology of Learning and Thinking or its equivalent

Course Content: This course will deal more intensively and at a more advanced level with some of the material introduced in 21.305. Additionally, consideration will be given to such topics as emotional and motivational factors in learning, processes involved in retention and forgetting, the development of language, and classroom climate. Pertinent research and theories in the various areas will be examined, and the student will participate in classroom discussion and presentation of the various topics.

Credit: 3 semester hours

21.307 Abnormal Psychology I (Offered 1962-63, 1st sem.)

Course Content: This is a two-semester course designed for educators and others concerned with the ways in which personality may become disordered. A careful survey of theories of personality development will serve as a base for discussing the malfunctioning personality as seen in the possible types of problems that may occur at various levels of development. Particular attention will be paid to problems of a neurotic nature and the types of defensive processes and attempts at problem solution that are noted. Case studies and films will serve as illustrations wherever possible.

Credit: 2 semester hours

21.308 Abnormal Psychology II (Offered 1962-63, 2nd sem.)

Preparation: 21.307 Abnormal Psychology I or its equivalent

Course Content: This course will continue to examine the etiology and symptoms of the more serious personality disorders. Such problems as conduct disorders, psychosomatic disorders, and psychoses will come under discussion. The current methods of clinical diagnosis and treatment will be reviewed. Case studies will be integrated with lectures and discussed.

Credit: 2 semester hours

21.309 Group Development (Offered yearly, 1st sem.)

Course Content: Emphasis in this course will be directed toward understanding the deeper questions of group growth, behavior, and action fundamental to developing solutions to the complex problems of group life. Students will learn to act as a group, to act democratically, to examine their strengths and weaknesses, to make group decisions, to become alert to new ideas and actions, to discover the pulse of a group, and why one group is productive while another is nonproductive. The group will examine intensively such areas as group process, sociodrama, sociometric techniques, attitude testing, social action project development, and communication blocks in human relations.

Credit: 2 semester hours

21.311 Psychology of the Mentally Retarded
(Offered 1962-63, 2nd sem.)

Course Content: A study of mentally retarded children through which students will gain a better understanding of how these children are able to learn, reason, and get along with people. Techniques used in making observations of what mentally retarded children say and do in order to interpret what they think and feel within themselves will be explored.

Credit: 2 semester hours

21.312 The Emotionally Disturbed Child
(Offered 1961-62, 1st sem.)

Course Content: Educators will study identification techniques for regular classroom use. Diagnostic procedures and referral agencies will be explored.

Skills to be employed in helping the emotionally disturbed child who remains in the regular classroom will be developed. An analysis will be made of problems of administration and participation in a team situation where emotionally disturbed children function in a segregated group.

Credit: 2 semester hours

21.322 Tests and Measurements

(Offered yearly, 1st sem., and summer)

Course Content: The principles and problems of psychological testing as applied to the field of education are discussed. Some consideration is given to elementary statistical concepts as they apply to test construction and the general problem of evaluation. Consideration is given to the proper selection of tests for classroom and system-wide use. The student is made familiar with some of the currently used tests of intelligence, scholastic aptitude, differential aptitudes, achievement, interest, and personality. Emphasis is placed on evaluating tests for use in education. Projective techniques are treated briefly. Attention is given to the improvement of teacher-made tests, and the student spends some time in the construction of an achievement test in his own area of interest.

Credit: 2 semester hours

21.323 Measurement of Intelligence (Offered yearly, 1st sem.)

Preparation: 21.322 Tests and Measurements or approval of instructor

Course Content: Deals with the nature of intelligence and its individual measurement using standardized techniques. Major emphasis is on the administration, scoring, and interpretation of the Stanford-Binet (Form L-M), and a certificate will be issued to those who complete the testing requirements under supervision. Other individual tests will be discussed, including the Wechsler Scales, and consideration will be given to the intellectual evaluation of individuals presenting special problems.

Credit: 2 semester hours

21.324 Advanced Measurement of Intelligence

(Offered yearly, 2nd sem.)

Preparation: 21.323 Measurement of Intelligence and evidence of competency with the Stanford-Binet Scale

Course Content: Deals with the individual measurement of intelligence utilizing the Wechsler Scales. Major emphasis is on the administration, scoring, and interpretation of these scales, and a certificate will be issued to those students who complete the testing requirements under supervision. Consideration will be given to the intellectual evaluation of individuals presenting special problems and to the adjunct diagnostic features of the Wechsler Scales.

Credit: 2 semester hours

21.325 Field Experience in Psychology

Preparation: Arrangement for this experience is made by consultation with the Director of Graduate Study in Education

Course Content: Persons wishing to concentrate graduate study in the field of school psychology and who may never have been employed in such service can acquire 120 or more hours of such experience by working under supervision in an approved school psychology program.

Credit: 4 semester hours

21.340 Research Methods in Education

(Offered yearly, 1st and 2nd sem., and summer)

Course Content: The student will receive a practical introduction to the study of educational problems through the completion of an original research study. The student will formulate a problem, review related research studies, collect and analyze original data, and draw conclusions from the findings of his study. This individual experience in carrying out and writing up a research study is supplemented by classroom discussion of methods of data collection and research design. Emphasis is placed on the experimental approach to the solution of educational problems and problems of measurement, observation, and other research designs are considered.

Credit: 3 semester hours

21.345 Field Experience in Special Education

Preparation: Arrangement for this experience is made by consultation with the Director of Graduate Study in Education

Course Content: Persons wishing to concentrate graduate study in the field of special education and who may never have been employed in such service can acquire 120 or more hours of such experience by working under supervision in an approved special education program.

Credit: 4 semester hours

21.351 The Nature, Management, and Special Education of Exceptional Children (Offered yearly, 1st sem.)

Course Content: A two-semester survey course for educators and all others concerned with one or more aspects of exceptional children. It will involve a study of the nature, etiology, diagnosis, treatment, and special education of the various problems of these children. This half of the course deals with physical handicap, visual impairment, organic disorders, brain injury, speech disorder, and hearing impairment. Lectures, discussions, clinical demonstrations, and films provide greater appreciation, understanding, and insight into the manifold problems of the exceptional child.

Credit: 3 semester hours

21.352 The Nature, Management, and Special Education of Exceptional Children (Offered yearly, 2nd sem.)

Course Content: This half of the course deals with intellectual deviates (both gifted and retarded), reading disabilities, behavior and emotional disorders,

vocational problems, delinquency, and a consideration of the psychological aspects of visual impairment.

Credit: 3 semester hours

21.353 Introduction to Speech and Hearing (Offered 1961-62, 1st sem.)

Course Content: A consideration of the fundamentals of normal speech development and the hearing process; etiological factors, symptomatology and classification of speech and hearing disorders; speech improvement versus speech therapy; the basic concepts underlying the problems of the speech handicapped, the hard of hearing, and the deaf; an orientation course for teachers, school administrators, psychologists, social workers, and nurses.

Credit: 2 semester hours

21.354 Applied Phonetics (Offered 1961-62, 2nd sem.)

Course Content: A survey of past and present phonetic systems; acquisition and application of the International Phonetic Alphabet; analysis of the vowel and consonant sounds of American English with phonetic transcription of typical and individual speech; the place of phonetics in speech and hearing therapy; the variables affecting standards for speech sounds and pronunciation.

Credit: 2 semester hours

21.355 Analysis and Treatment of Reading Disabilities (Offered yearly, 2nd sem.)

Course Content: A consideration of reading problems in terms of types of deviations from the normal reading process. The course will include discussion of the nature of reading disabilities, their causes, methods of diagnosis, and methods of remediation.

Credit: 2 semester hours

21.356 Industrial Arts and Crafts for Special Classes (Offered summer, 1962)

Course Content: Industrial arts for Special Class teaching. A course in the use of tools and construction that will prepare a teacher for Special Class teaching. Will consider the building of a background knowledge of shop tools and their uses plus the practical shop experiences of working through some projects, both in wood-working and metal work. The equipment necessary for a Special Class industrial arts room will be listed, and experience in use of such equipment will be provided.

Credit: 3 semester hours

21.357 Teaching the Slow Learner (Offered 1962-63, 1st sem.)

Course Content: A study of the types of slow-learning children—the mentally retarded, the educationally retarded, the emotionally handicapped children who are enrolled in the regular classrooms—with emphasis on the adaptation

of the curriculum to effect an adequate adjustment for these children. Other aspects to be studied will be the diagnosis and classification of retarded children; the help from the home, the church, and other community resources; the extent of therapy in the school program; a study of the psychology of the retarded child in relation to a flexible curriculum for his growth and development.

Credit: 2 semester hours

21.358 Teaching the Gifted Child (Offered 1961-62, 2nd sem.)

Course Content: A study of the research on the gifted child will be made, including the physical, social, and emotional development of such children. Means of identifying the gifted child will be presented. The various methods of providing adequate educational opportunities will be reviewed such as: enrichment, segregated classes, acceleration, and special programs.

Credit: 2 semester hours

21.359 Home Economics for Special Classes (Offered summer, 1961)

Course Content: A course for teachers of Special Classes to help them become prepared to teach and integrate a domestic arts program in the total curriculum of the retarded child. The practical aspects of buying, food preparation, serving, and preservation will be studied. The study of clothing will cover the areas of buying, mending, sewing, and laundering. Good health practices in the home will be outlined, and means of correlating these learnings into the total program will be developed.

Credit: 2 semester hours

21.370 Fundamentals of Guidance (Offered yearly, summer)

Course Content: A combination of courses 21.371 and 21.372.

Credit: 6 semester hours

21.371 Fundamentals of Guidance: Basic Concepts (Offered yearly, 1st sem.)

Course Content: The purpose of this course will be to examine critically basic concepts and techniques of school guidance. The role of the teacher, administrator, and guidance specialist will be explored through the analysis of individual case problems encountered at elementary, secondary, and post-secondary school levels. Attention will be directed to practices of gathering information about individuals and giving aid to them through individual counsel and related activities.

Credit: 3 semester hours

21.372 Fundamentals of Guidance: Programs and Policies (Offered yearly, 2nd sem.)

Preparation: 21.371 Fundamentals of Guidance

Course Content: A review of student personnel programs in local schools and colleges will be related to an analysis of merging trends of guidance policy and practice in the modern American school. Divergent trends in counseling and recent research in the areas of occupational choice and ju-

venile delinquency will provide a basis for evaluating the qualifications and responsibilities of school guidance personnel and the place of guidance in the school curriculum.

Credit: 3 semester hours

21.373 Occupational Information (Offered summer, 1961)

Course Content: This course is designed to serve as a background for teachers and counselors. The following areas of occupational information will be emphasized: occupational trends in relation to social and economic changes, classification and description of job opportunities, collecting and evaluating occupational information, and compilation and maintenance of files on occupational source materials.

Credit: 2 semester hours

21.374 Counseling (Offered yearly, 2nd sem.)

Preparation: 21.322 Tests and Measurements, 21.371 Fundamentals of Guidance: Basic Concepts, and 21.372 Fundamentals of Guidance: Programs and Policies

Course Content: This course is planned to give teachers an understanding of counseling theories and to provide elementary proficiencies in counseling students on problems of educational, vocational, social, and emotional adjustment. Typical case materials will be presented to the class for analysis and discussion. Members of the class will participate in counseling sessions.

Credit: 2 semester hours

21.375 Field Experience in Guidance

Preparation: Arrangement for this experience is made by consultation with the Director of Graduate Study in Education

Course Content: Persons wishing to concentrate graduate study in the field of guidance and who may have had no experience in guidance work in the schools can acquire 120 hours or more of such experience by working under supervision in the Testing and Counseling Center of the University and/or in a guidance program in a public school.

Credit: 4 semester hours

21.400 Social Foundations of Education

(Offered yearly, summers)

Course Content: A combination of courses 21.401 and 21.402.

Credit: 6 semester hours

21.401 Social Foundations of Education (Offered yearly, 1st sem.)

Course Content: A course designed to increase understanding of human behavior and to develop objectivity and perspective in viewing society. Human personality will be viewed in its dynamic aspects and in relationship to group influences. The American school will be analyzed as a social institution within the broader framework of a dynamic social system.

Credit: 3 semester hours

21.402 Social Foundations of Education

(Offered yearly, 2nd sem.)

Preparation: 21.401 Social Foundations of Education*Course Content:* Investigation of contemporary trends and issues and analysis of personal and social problems in American society. Emphasis will be placed upon critical analysis of American ideals and values and the role of the school in a democratic society.*Credit:* 3 semester hours**21.422 American Government and Education**

(Offered 1962-63, 1st sem.)

Course Content: A study of the relationship of government and education in a democratic society. After considering the historical role of American Government in education, special emphasis will be given to such contemporary problems as academic freedom, federal aid to education, fiscal policy, segregation, and separation of church and state.*Credit:* 2 semester hours**21.435 Semantics for Teachers** (Offered summer, 1961)*Course Content:* The implications for education of the new discoveries in linguistics, theory of communication, and general semantics. Among the topics to be included will be techniques for training more mature thinking, better communication, reading and listening for meaning, more alert observation, etc. The course will describe principles and techniques useful for teachers at any age-level of the schools and will include methods for the teacher to improve his own evaluation and communication.*Credit:* 3 semester hours**21.451 Workshop in Arts and Crafts** (Offered summer, 1962)*Course Content:* A course designed to aid in the teaching of arts and crafts to all children including special classes. Emphasis will be on the creation of designs and the technique of their practical application to objects of everyday use as interpreted in various media related to stenciling, linoleum-block printing, glass decoration, mosaics, collage, pen lettering, papier-mâché, crayons, etc. Instruction will be flexible enough to suit the needs of each member enrolled. No past experience is necessary.*Credit:* 2 semester hours**21.474 History of Educational Thought** (Offered summer, 1961)*Course Content:* A combination of courses 21.475 and 21.476.*Credit:* 4 semester hours**21.475 History of Educational Thought I**

(Offered yearly, 1st sem.)

Course Content: This course will examine educational theory and practice from antiquity to the Reformation. An attempt will be made to apply sociological and philosophical viewpoints to systems of education, beginning with

primitive societies and continuing through Oriental civilizations, the classical period of Greece and Rome, the early and medieval Christian eras, the Renaissance period, and the Reformation.

Credit: 3 semester hours

21.476 History of Educational Thought II
(Offered yearly, 2nd sem.)

Course Content: A continuation of 21.475. The course deals with the development of educational theory and practice from the time of the Reformation to the present. Among the topics considered are: the transition from humanism to realism in education; rationalism and naturalism, as these are reflected in education; psychologizing education; the growth of the curriculum; the "new" education.

Credit: 3 semester hours

21.477 Philosophy of Education (Offered yearly, 2nd sem.)

Course Content: This course will analyze the various philosophies of education with reference to their historical background and with particular emphasis upon their relation to contemporary educational practice. For example, the class will consider such themes as educational aims, values, and curriculum; religious and moral education; intellectual freedom; the relationship between school and society, and between the school and the individual.

Credit: 2 semester hours

21.501 - 21.502 Thesis—Seminar

Course Content: Original study under the direction of the department.



Engineering Programs

INFORMATION APPLYING TO ENGINEERING PROGRAMS

The curricula of the degree programs are given under each departmental heading. The descriptions of courses offered by the several departments are given so that prospective students may obtain a view of the course coverage. Preparation courses are indicated in each instance. Not all courses are offered every year, but the course offerings will be arranged in such a manner that students may make continuous progress toward the degree.

The number of students enrolled in each class will be limited to permit effective teaching at the graduate level, and the University reserves the right to cancel any course for which an insufficient number of students apply.

All courses carry two semester hours of graduate credit unless specified otherwise.

The full-time day program in chemical, civil, electrical and mechanical engineering is given on the co-operative plan. Students alternate work periods with class periods on a ten-week basis. The degree requirements are completed in forty weeks of work spread over two years. The academic calendar is given on the following pages. Applications for these programs should be filed as soon after January 15 as possible with all supporting data as required by the Graduate School. The curricula of these programs are given under the departmental headings.

Evening part-time programs are given in the departments of civil, electrical, mechanical engineering and engineering management. The curricula for each of these courses of study are given under the respective departments. All part-time students must register in the Graduate School and present a transcript of undergraduate records at that time. A circular describing the courses offered during the first semester and giving the registration and interview dates is issued in July. A similar circular for the second semester is issued in December, and for the summer one is issued in May.

ACADEMIC CALENDAR**Evening Part-time Program****May 1961 - June 1962****SUMMER SESSION 1961**

Interview and Registration Period	Monday-Saturday	May 22-June 3
Memorial Day, Office Closed	Tuesday	May 30
Classes Begin	Monday	June 5
Independence Day, No Classes	Tuesday	July 4
Classes End	Tuesday	July 25
Examination Period	Wednesday-Thursday	July 26-July 27

FIRST SEMESTER 1961-1962

Registration Period for Former Students	Wednesday-Saturday	July 5-Sept. 9
Interview and Registration Period for New Students	Monday-Saturday	Aug. 14-Sept. 9
Labor Day, Office Closed	Monday	Sept. 4
Classes Begin	Monday	Sept. 11
Columbus Day, No Classes	Thursday	Oct. 12
Veterans' Day, Office Closed	Saturday	Nov. 11
Thanksgiving Vacation	One Week	Nov. 20-Nov. 24
Classes Resume	Monday	Nov. 27
Christmas Vacation	Two Weeks	Dec. 19-Jan. 1
Classes Resume	Tuesday	Jan. 2
Classes End	Friday	Jan. 12
Examination Period	Monday-Friday	Jan. 15-Jan. 19
No Classes	Monday-Friday	Jan. 22-Jan. 26

SECOND SEMESTER 1961-1962

Registration Period for Former Students	Tuesday-Saturday	Jan. 2-Jan. 27
Interview and Registration Period for New Students	Monday-Saturday	Jan. 8-Jan. 27
Classes Begin	Monday	Jan. 29
Washington's Birthday, No Classes	Thursday	Feb. 22
Patriots' Day, No Classes	Thursday	April 19
Classes End	Friday	May 11
Make-up for Classes Missed		
Thursday, April 19	Thursday	May 17
Examination Period	Monday-Friday	May 21-May 25

ACADEMIC CALENDAR

Graduate Co-operative Program

July, 1961 - June, 1962

Registration for both Division A and B Second Year Students	Monday-Friday	July 10-Aug. 11
Registration for both Division A and B First Year Students	Monday-Friday	Aug. 14-Sept. 8
Labor Day; Office closed	Monday	Sept. 4
Classes begin for Division A students	Monday	Sept. 11
Columbus Day; no classes	Thursday	Oct. 12
Final Examination Period for all Division A students	Monday-Friday	Nov. 13-17
Classes begin for Division B students	Monday	Nov. 20
Thanksgiving; no classes	Thursday	Nov. 23
Classes end at 5 p.m. for Christmas holiday	Friday	Dec. 22
Classes resume after holiday at 9 a.m.	Thursday	Dec. 28
New Year's Day; no classes	Monday	Jan. 1
Final Examination Period for all Division B students	Monday-Friday	Jan. 22-26
Second Term classes begin for Division A students	Monday	Jan. 29
Classes end at 5 p.m. for Washington's Birthday recess	Tuesday	Feb. 20
Classes resume after recess at 9 a.m.	Monday	Feb. 26
Thesis due for Second Year Division A students	Monday	March 19
Final Examination Period for Second Year Division A students	Monday-Friday	March 26-30
Final Examination Period for First Year Division A students	Monday-Friday	April 2-6
Second Term classes begin for Division B students	Monday	April 9
Patriots' Day; no classes	Thursday	April 19
Thesis due for Second Year Division B students	Monday	May 28
Memorial Day; no classes	Wednesday	May 30
Final Examination Period for Second Year Division B students	Monday-Friday	June 4-8
Final Examination Period for First Year Division B students	Monday-Friday	June 11-15
Commencement	Sunday	June 17

COMMITTEE ON GRADUATE STUDY IN ENGINEERING

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*Assistant Dean of Graduate Study in Engineering and
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CHESTER P. BAKER, S.B., M.A.

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Vice President and Provost of the University

ROY L. WOOLDRIDGE, S.B., Ed.M.

Dean of Co-operative Education and Professor of Co-operative Education

TEACHING STAFF

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RALPH E. BACH, JR.	<i>Assistant Professor of Research in Communications, Northeastern University</i>
ROBERT L. BERRINGER	<i>Arthur D. Little, Inc.</i>
RALPH S. BLANCHARD, JR.	<i>Associate Professor of Mechanical Engineering, Northeastern University</i>
GEORGE G. BOGREN	<i>Partner, Weston and Sampson</i>
IRVING BOSINOFF	<i>Engineering Specialist, Sylvania Electric Products, Inc.</i>
ALLEN J. BURDOIN	<i>Consultant, Metcalf & Eddy</i>
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JOHN J. KLEIN	<i>Engineering Scientist, Radio Corporation of America</i>
R. STEVENS KLEIN-SCHMIDT	<i>Assistant Professor of Civil Engineering, Northeastern University</i>
ROBERT C. KUHN	<i>Plant Accountant, General Electric Company</i>
EARLE R. LASTE	<i>Assistant Professor of Electrical Engineering, Northeastern University</i>
JOSEPH H. LENNEY	<i>Assistant Professor of Civil Engineering, Northeastern University</i>
PASCAL LEVESQUE	<i>Chief of Metallurgical Research, Raytheon Company</i>
WALTER H. LOB	<i>Associate Professor of Research in Communications, Northeastern University</i>
MORTON LOEWENTHAL	<i>Staff Member, Lincoln Laboratory, Massachusetts Institute of Technology</i>
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EDWARD J. MASKALENKO	<i>Associate Professor of Electrical Engineering, Tufts University</i>
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ROBERT B. WILCOX	<i>Project Manager, Missile Systems Laboratory, Sylvania Waltham Laboratories</i>
HARRY B. WOLFE	<i>Staff Member, Arthur D. Little, Inc.</i>
ALVIN J. YORRA	<i>Assistant Professor of Mechanical Engineering, Northeastern University</i>
JOHN ZOTOS	<i>Assistant Professor of Mechanical Engineering, Northeastern University</i>

CHEMICAL ENGINEERING

Admission

To be enrolled for graduate work in chemical engineering, applicants must have obtained a Bachelor of Science degree in Chemical Engineering from a recognized institution.

THE MASTER'S DEGREE

FULL-TIME PROGRAM ON CO-OPERATIVE PLAN

The full-time program in chemical engineering operates on the co-operative plan as outlined in the general regulations of the Graduate School and the Academic Calendar shown in this section of the catalogue. Students will be expected to follow the plan of study as outlined below. At the beginning of the second term an advisor for each student will be appointed who will approve the thesis option if allowed.

Master of Science in Chemical Engineering

FIRST YEAR

First Term		Second Term	
4.711	Thermodynamics 2	4.822	Transport Phenomena . 2
4.811	Mass Transfer (Distil.) ... 2	4.902	Thesis 2
	Electives 4		Electives 4
	8		8

SECOND YEAR

First Term		Second Term	
4.813	Mass Transfer (Diffus.) 2	4.722	Chemical Eng. Kinetics 2
4.903	Thesis 2	4.904	Thesis 2
	Electives 4		Electives 2
	8		6

ELECTIVES

Eight semester hours must be elected from the following courses:

4.103	Mathematics for Chemical Engineers	4.222	Colloidal and Amorphous Material
4.104	Computational Procedures	4.302	Design-Chemical Processes
4.111	Properties of Liquids and Gases	4.405	Fluid Mechanics and Heat Transfer

Six semester hours may be elected from any courses in engineering or science for which the student has the necessary preparation.

DESCRIPTION OF COURSES

4.103 Mathematics for Chemical Engineers

(Open only to co-operative chemical engineering students)

Preparation: Bachelor of Science degree in Chemical Engineering and differential equations

Course Content: A consolidation of mathematical procedures most used by chemical engineers. Attention is given to the problem of expressing a physical situation in mathematical language.

4.104 Computational Procedures for Chemical Engineers

Preparation: Bachelor of Science degree in Chemical Engineering, including differential equations

Course Content: The various computational procedures used for the solution of complex chemical engineering problems are studied and compared. The use of the IBM 650 digital computer for more rapid solutions is indicated wherever necessary.

4.111 Properties of Liquids and Gases

Preparation: Bachelor of Science degree in Chemical Engineering or Chemistry

Course Content: A presentation and critical analysis of methods of correlating and estimating the physical properties of gases and liquids.

4.222 Colloidal and Amorphous Material

Preparation: Bachelor of Science degree in Chemical Engineering or Chemistry

Course Content: Survey of colloidal science and detailed study of surface phenomena. Structure and properties of interfaces, functions and uses of surfactants; emulsification, foaming and detergency. Thermodynamics and kinetics of nucleation and crystal growth. Adhesion and adhesives. Application of surface phenomena to chemical process technology.

4.241 Corrosion Fundamentals (Offered 1961-62, 1st sem.)

Preparation: Bachelor of Science degree

Course Content: Economic factors, basic theories, types, behaviors of specific systems and protection against corrosion are studied. Wherever possible, engineering applications of the principles studied are emphasized.

4.302 Design—Chemical Processes

Preparation: Bachelor of Science degree in Chemical Engineering

Course Content: A study of some of the techniques used by project engineers in process design. The design of a chemical process is undertaken as a student project.

4.405 Fluid Mechanics and Heat Transfer

Preparation: Fluid mechanics and heat transfer

Course Content: A study of the fundamentals of fluid dynamics which are basic to an understanding of convection heat transfer.

4.503 Chemical Data Estimation (Offered 1961-62, 2nd sem.)

Preparation: Bachelor of Science degree

Course Content: Methods of obtaining physical and thermodynamic properties of chemical compounds and systems without resorting to laboratory investigations. Latest empirical relationships and physical and thermodynamic laws are introduced to obtain data for plant design and other chemical and engineering uses.

4.711 Thermodynamics

Preparation: Chemical engineering thermodynamics

Course Content: A thermodynamic analysis of processes of interest to the chemical engineer. Thermodynamics is used as a tool and a method of approach to the solution of industrial problems. Fundamental principles are reviewed to the extent needed.

4.722 Chemical Engineering Kinetics

Preparation: Thermodynamics, chemical engineering kinetics or equivalent

Course Content: A review is made of the principles of reaction kinetics. Problems for solution similar to those encountered in the design and operation of reaction equipment are selected to illustrate important principles.

4.811 Mass Transfer (Distillation)

Preparation: Unit operations or equivalent

Course Content: Review of the physical chemistry background of distillation and rectification covering development of phase equilibria relationships and thermodynamic evaluation of experimental data. This is a more complete and advanced treatment of distillation than is possible in an undergraduate course.

4.813 Mass Transfer (Diffusion)

Preparation: Unit operations or equivalent

Course Content: Development of basic rate equations for mass transfer involved in the transfer of materials between phases. Absorption and extraction processes are studied.

4.822 Transport Phenomena

Preparation: Unit operations or equivalent

Course Content: A consideration of the relationships of Mass, Momentum, and Energy Transfer. Fundamental equations of change covering the transport of momentum, heat, and mass are developed to illustrate the essential

unity of the transport processes. Molecular, microscopic, and maseroscopic systems are studied. It will be seen that much of the theory behind the engineering calculations on which the unit operations of chemical engineering are based can be organized and integrated in terms of equations of change.

4.902 - 4.904 Thesis

Course Content: Analytical and/or experimental work conducted under the auspices of the department.

CIVIL ENGINEERING

Admission

To be enrolled for graduate work leading to the degree of Master of Science in Civil Engineering, applicants must have obtained a Bachelor of Science degree in Civil Engineering from a recognized institution. Applicants with a bachelor's degree in other fields and an appropriate background of preparation may pursue this program and qualify for the degree of Master of Science without specification.

THE MASTER'S DEGREE

FULL-TIME PROGRAM ON CO-OPERATIVE PLAN

The full-time program in civil engineering operates on the co-operative plan as outlined in the general regulations of the Graduate School and the Academic Calendar shown in this section of the catalogue. Students will be expected to follow the plan of study as outlined below. At the beginning of the second year, an advisor for each student will be appointed who will approve the thesis option if allowed.

Master of Science in Civil Engineering

FIRST YEAR

First Term		Second Term	
1.401	Indeterminate Structures .. 2	1.402	Indeterminate Structures .. 2
1.503	Soil Mechanics 2	1.504	Soil Mechanics 2
2.201	Theory of Elasticity 2	2.202	Theory of Elasticity 2
14.101	Advanced Mathematics 2	14.102	Advanced Mathematics 2
	or .. 2		—
14.106	Advanced Mathematics —		8
	8		

SECOND YEAR

First Term		Second Term	
1.403	Indeterminate Structures .. 2	1.506	Soil Testing Laboratory .. 2
1.505	Soil Mechanics .. 2	1.602	Design of Structures 2
1.601	Design of Structures 2	1.902	Thesis or Electives 2
1.901	Thesis or Electives 2		—
	8		6

ELECTIVES

The electives may be taken from the courses given for co-operative students in mechanical and electrical engineering.

EVENING PART-TIME PROGRAMS

The admission requirements for these programs are the same as for the full-time program, but students may progress according to their abilities and the time available.

REQUIRED COURSES

Structures Major			Sanitary Major		
1.401	Indeterminate Structures	2	1.201	Sanitary Engineering	2
1.402	Indeterminate Structures	2	1.202	Sanitary Engineering	2
1.403	Indeterminate Structures	2	1.203	Sanitary Chemistry	2
1.503	Soil Mechanics	2	1.204	Sanitary Bacteriology	2
1.504	Soil Mechanics	2	1.205a	Sanitary Analysis	2
1.505	Soil Mechanics	2	1.205b	Sanitary Analysis	2
1.601	Design of Structures	2	1.206a	Sanitary Laboratory	2
1.602	Design of Structures	2	1.206b	Sanitary Laboratory	2
		16			16

ELECTIVES

Fourteen semester hours must be elected from civil engineering courses or from any courses in engineering or science for which the student has the necessary preparation.

DESCRIPTION OF COURSES

1.201 Sanitary Engineering (Offered yearly, 1st sem.)

Preparation: Two semesters of sanitary engineering

Course Content: The theory and practice of water treatment and the basic design of water treatment works, including: slow sand filtration, sedimentation, coagulation, rapid sand filtration, softening, disinfection, corrosion control, iron removal, and fluoridation.

1.202 Sanitary Engineering (Offered yearly, 2nd sem.)

Preparation: Two semesters of sanitary engineering

Course Content: The theory and practice of sewage treatment and the basic design of sewage treatment works, including: requirements of receiving waters, screening, grit removal, sedimentation, Imhoff tanks, chemical treatment, trickling filters, sand filters, activated sludge process, treatment and disposal of sludge in digesters, drying beds and filters, and disinfection.

1.203 Sanitary Chemistry (Offered 1961-62, 1st sem.)

Preparation: Two semesters of general chemistry

Course Content: An advanced course of general chemistry stressing the basic chemical laws as they apply to the field of sanitary engineering. The course includes the following: fundamental laws, stoichiometry, gas laws, atomic structure, periodic system, hydrogen, alkali metals, halogens, oxygen group, aluminum group, carbon, nitrogen group, iron and manganese, acidimetric normality, oxidation and reduction, and oxidation potential.

1.204 Sanitary Bacteriology (Offered 1961-62, 2nd sem.)

Preparation: 1.203 Sanitary Chemistry

Course Content: A course of study in the field of bacteriology with emphasis on those phases of bacteriology employed by the sanitary engineer, namely, growth, form, environment, enzymes, disinfection, carbon cycle, nitrogen cycle, molds, yeasts, iron bacteria, sulphur bacteria, bacteriology of water and sewage, bacteriology of milk, swimming pools, and quantitative bacteriology.

1.205a Sanitary Analysis (Offered 1962-63, 1st sem.)

Preparation: 1.203 Sanitary Chemistry and 1.204 Sanitary Bacteriology

Course Content: A laboratory course applying the principles of quantitative chemical analysis to the treatment of water and sewage. "Standard Methods" of analysis of water and sewage (chemical and bacteriological) are employed. The writing and interpretation of sanitary reports are stressed.

1.205b Sanitary Analysis (Offered 1962-63, 2nd sem.)

Preparation: 1.205a Sanitary Analysis

Course Content: A continuation of the laboratory course of 1.205a. Further analysis of water and sewage is pursued. The reporting and interpretation of sanitary reports are again stressed.

1.206a Sanitary Laboratory (Offered 1961-62, 1st sem.)

Preparation: 1.205b Sanitary Analysis

Course Content: A laboratory course studying water purification and the writing of reports on the following topics: aeration, coagulation, odor and taste removal, corrosion, and softening.

1.206b Sanitary Laboratory (Offered 1961-62, 2nd sem.)

Preparation: 1.206a Sanitary Laboratory

Course Content: A continuation of course 1.206a, but studying sewage treatment and written reports on the following topics: B. O. D., chemical precipitation, sludge filtration, chlorination, activated sludge, and sludge digestion.

1.208 Industrial Waste (Offered 1962-63, 1st sem.)

Preparation: 1.203 Sanitary Chemistry and 1.204 Sanitary Bacteriology

Course Content: A study of various manufacturing processes and their waste problems, together with methods of utilization, treatment, and disposal of their waste products. Specific processes that can be adapted to specific waste and their necessary concomitant structures are studied with the viewpoint of designing suitable treatment plants.

1.209 Stream Sanitation (Offered 1962-63, 2nd sem.)

Preparation: 1.203 Sanitary Chemistry and 1.204 Sanitary Bacteriology

Course Content: This course deals with the basic principles of stream sanitation and corrective control methods. The topics taken up in this course include the following: aerobic and anaerobic decomposition, oxygen balance, carbon dioxide, oxidation, reduction, bacterial pollution, industrial pollution, sewage pollution, water supply, shellfish, fish life, riparian rights, recreation, and general stream sanitation.

1.211 Advanced Hydraulics (Offered 1961-62, 1st sem.)

Preparation: Two semesters of hydraulics

Course Content: An advanced course in hydraulics, presenting the following concepts: energy, continuity, momentum, flow nets, significance of the Froude and Reynolds numbers, fluid motion in a closed conduit, open channels, surface resistance, dimensional analysis, dynamic similarity, theory of models, and pipe networks.

1.212 Advanced Hydraulics (Offered 1961-62, 2nd sem.)

Preparation: 1.211 Advanced Hydraulics

Course Content: A continuation of course 1.211, with further study of open channel flow, backwater curve, drawdown curve, hydraulic jump, location of hydraulic jump, transitions in channels, theory of waves, cavitation, and water hammer.

1.213 Hydrology (Offered 1962-63, 1st sem.)

Preparation: Differential and integral calculus

Course Content: A study of the principles of statistical methods as applied to hydraulic and sanitary engineering.

1.214 Hydrology (Offered 1962-63, 2nd sem.)

Preparation: 1.213 Hydrology

Course Content: A continuation of course 1.213, emphasizing the following: the collection and sampling of raw data with an aim to predicting such phenomena as precipitation, run-off, floods, and stream flow. Analysis, correlation, and accuracy of these predictions are studied and compared by arithmetic and graphical methods.

1.401 Indeterminate Structures (Offered yearly, 1st sem.)

Preparation: Differential and integral calculus and theory of structures

Course Content: Analysis of structures starting with a review of elementary theory, indeterminateness, stability, deflections, and proceeding to the analysis of indeterminate beams and trusses with strain energy (Castigliano), moment area, and theorem of three moments.

1.402 Indeterminate Structures (Offered yearly, 2nd sem.)

Preparation: 1.401 Indeterminate Structures

Course Content: Continuation of course 1.401. Analysis of indeterminate frames, arches, and trusses by virtual work, slope deflection, and moment distribution. Effect of variable stiffness considered. Column analogy.

1.403 Indeterminate Structures (Offered yearly, 1st sem.)

Preparation: 1.402 Indeterminate Structures

Course Content: Continuation of course 1.402. Shear and moment distribution in the analysis of broken-story frame building for horizontal and vertical loads. Influence lines for indeterminate frames and trusses. Cables and suspension systems. Circular domes. Planar structure analyzed for loads perpendicular to its plane. Space frameworks. Introduction to Relaxation Methods.

1.404 Indeterminate Structures (Offered 1962-63, 2nd sem.)

Preparation: 1.403 Indeterminate Structures

Course Content: Included in this course are the following: Southwell's Relaxation Method, its application to pin-jointed frameworks and to rigid-jointed frameworks; secondary stresses in trusses, by classical methods and by iterative methods; analysis of towers and cables for electrical transmission lines, catenaries on inclined spans, and bimetallic cables.

1.501 Cement and Concrete Technology
(Offered yearly, 1st sem.)

Preparation: Materials of engineering

Course Content: The following topics are considered: manufacture, physical and chemical properties of the various types of Portland cement, chemical and physical properties of aggregates, control of concrete materials, concrete mix design methods, factors affecting the properties of plastic concrete and concrete mix control. Two laboratory periods will be held during this semester.

1.502 Cement and Concrete Technology

(Offered yearly, 2nd sem.)

Preparation: 1.501 Cement and Concrete Technology*Course Content:* A continuation of course 1.501, studying the following: physical properties and durability of hardened concrete, effect of aggregate characteristics on properties of concrete, including alkali-aggregate reactions, consideration of admixtures used in concrete manufacture such as air-entrainment, wetting, dispersion, pozzolanic materials, and use of lightweight aggregates. Special topics such as "Pumperete" methods, intrusion (Prepakt) concrete, soil cement, and dynamic modulus will be discussed. Two laboratory periods will be held during this semester.**1.503 Soil Mechanics and Foundation Engineering**

(Offered yearly, 1st sem.)

Preparation: Differential and integral calculus*Course Content:* Phase relationships; soil classification and identification; subsurface explorations; seepage and ground water flow; theory of consolidation.**1.504 Soil Mechanics and Foundation Engineering**

(Offered yearly, 2nd sem.)

Preparation: 1.503 Soil Mechanics and Foundation Engineering*Course Content:* Stress distribution, settlement analyses; stress deformation and strength properties; stability of slopes and embankments.**1.505 Soil Mechanics and Foundation Engineering**

(Offered yearly, 1st sem.)

Preparation: 1.504 Soil Mechanics and Foundation Engineering*Course Content:* Lateral pressures; retaining wall and bulkhead design; bearing capacity of footings, piers, pile foundations; practical applications; uncertainties in design assumptions.**1.506 Soil Testing Laboratory (Offered yearly, 2nd sem.)***Preparation:* 1.503 Soil Mechanics and Foundation Engineering*Course Content:* A laboratory course covering classification tests (Atterberg limits, specific gravity, and grain size analysis), compaction, permeability, consolidation, strength characteristics (unconfined compression, triaxial compression, and California Bearing Ratio) and field control tests.**1.601 Design of Structures (Offered yearly, 1st sem.)***Preparation:* 1.402 Indeterminate Structures*Course Content:* An advanced course in structural design of steel and concrete including: critical inspection of building frames with emphasis on economics and selection of type, loft buildings, tall buildings, mill buildings, wind forces, and riveted and welded wind bracing connections.

1.602 Design of Structures (Offered yearly, 2nd sem.)

Preparation: 1.601 Design of Structures

Course Content: A continuation of course 1.601, including the following topics: columns, columns in bending, requirements for lateral support, prestressing in steel and concrete, design of structures for dynamic loads, stress design vs. limit design, and timber design.

1.605 Prestressed Concrete (Offered yearly, 2nd sem.)

Preparation: Reinforced concrete design

Course Content: The following topics are considered: basic design concepts, properties of materials used for prestressing, review of research in prestressed concrete, construction practice covering various methods of both pre-tensioning and post-tensioning used to date, discussion of tests, and economics of prestressed concrete.

1.901 - 1.902 Thesis (Offered yearly)

Course Content: Analytical and/or experimental work conducted under the auspices of the department.

ELECTRICAL ENGINEERING

Admission

To be enrolled for graduate work leading to the degree of Master of Science in Electrical Engineering, applicants must have obtained a Bachelor of Science degree in Electrical Engineering from a recognized institution. Applicants with a bachelor's degree in other fields and an appropriate background of preparation may pursue this program and qualify for the degree of Master of Science without specification.

THE MASTER'S DEGREE

FULL-TIME PROGRAM ON CO-OPERATIVE PLAN

The full-time program in electrical engineering operates on the co-operative plan as outlined in the general regulations of the Graduate School and the Academic Calendar shown in this section of the catalogue. Students will be expected to follow the plan of study as outlined below. At the beginning of the second term, an advisor for each student will be appointed who will approve the thesis option if allowed.

Master of Science in Electrical Engineering

FIRST YEAR

First Term		Second Term	
3.203	Analog & Digital Computers	3.402	Transients in Linear Systems
	2		2
3.401	Transients in Linear Systems	3.901	Electric Circuit Theory
	2		2
14.105	Advanced Mathematics	3.951	Seminar
	2		2
	Electives		Electives
	2		2
	—		—
	8		8

SECOND YEAR

14.106	Advanced Mathematics	15.105	Advanced Physics
	2		2
3.902	Electric Circuit Theory	3.954	Thesis or Electives
	2		2
3.953	Thesis or Electives		Electives
	2		2
	Electives		—
	2		6
	—		
	8		

ELECTIVES

The electives may be taken from the following courses:

3.101	Servomechanisms Theory	3.301	Theory of Microwaves
3.102	Advanced Servomechanisms	3.302	Theory of Microwaves
3.201	Pulse and Digital Circuits	3.501	Communication Theory
3.202	Pulse and Digital Circuits	3.502	Communication Theory
3.204	Digital Computer Coding and Logic	3.605	Transistor Circuit Engineering
3.215	Computing and Control Devices	3.606	Transistor Circuit Engineering

EVENING PART-TIME PROGRAMS

The admission requirements for the part-time program leading to the degree of Master of Science in Electrical Engineering are the same as for the full-time program, but students may progress according to their abilities and the time available. Students who have not had the equivalent of 14.101 Advanced Mathematics must register for this course as their mathematics elective.

Master of Science in Electrical Engineering

REQUIRED COURSES

Electronics-Communication Major		Electric-Power Major	
3.401, 3.402	Transients in Linear Systems	3.401	Transients in Linear Systems
	4		2
or			
3.501, 3.502	Communication Theory	3.402	Transients in Linear Systems
	4		2
or		3.611	Adv. Electrical Machinery
3.501, 3.503	Communication Theory		2
	4	3.612	Adv. Electrical Machinery
3.901, 3.902	Electric Circuit Theory		2
	4	3.911	Electric Power Circuits
14.101	Advanced Mathematics		2
	2	3.912	Electric Power Circuits
or			2
Mathematics Elective		14.101	Advanced Mathematics
14.102	Advanced Mathematics		2
	2		or
*Physics Requirement	4		Mathematics Elective
		14.102	Advanced Mathematics
			2
			16
	16		

*This requirement must be satisfied by one of the following pairs:

15.101	Theoretical Physics	15.101	Theoretical Physics
15.102	Theoretical Physics	15.103	Advanced Mechanics
	15.102		Theoretical Physics
	15.104		Electromagnetic Theory II

ELECTIVES

Eight semester hours must be elected from electrical engineering courses. Six semester hours may be elected from graduate courses in engineering or science for which the student has the necessary preparation.

THE DOCTOR'S DEGREE

Qualifying Examination

The qualifying examination for the Ph.D. degree is taken normally at the end of the second year of graduate study. If any part of the examination is failed, it may be repeated with permission of the department. On the basis of the qualifying examination, a student may be admitted to candidacy for the Ph.D. degree.

Language Requirements

The languages in which proficiency must be demonstrated in accordance with the general Graduate School regulations will be specified by the department.

Comprehensive Examination

The comprehensive examination will be given no earlier than one year after the degree candidacy has been established and no later than eight months before the commencement at which the degree is to be awarded.

Thesis

After degree candidacy has been established, arrangements for a thesis advisor must be completed. A thesis committee will also be appointed by the chairman of the department. This committee will be kept informed concerning the progress of the thesis and will approve the thesis in its final form.

Final Oral Examination

This examination will be held in accordance with the Graduate School regulations.

DESCRIPTION OF COURSES

The present trend in the field of electrical engineering is toward a greater emphasis on physico-mathematical techniques. Hence, the electrical curricula of the contemporary graduate schools are emphasizing the analytical approach to electrical engineering problems rather than the purely empirical. Accordingly, the courses outlined below have been designed to present particularly the analytical methods used in solving various types of modern electrical engineering problems without, however, neglecting altogether those practical considerations necessary for engineering applications. Where appropriate, laboratory demonstrations and exercises have been included.

3.101 Servomechanisms Theory (Offered yearly, 1st sem.)

Preparation: Transient analysis using Laplace transforms

Course Content: A comprehensive treatment of the methods of analysis and compensation as applied to closed-loop control systems. Use of Laplace-transformation techniques for the formulation and manipulation of transfer functions and signal-flow diagrams. Frequency-response analysis with emphasis on vector-contour techniques using linear and logarithmic representation of transfer functions. Adjustments and optimum design considerations using lead and integral-compensation techniques.

3.102 Advanced Servomechanisms (Offered yearly, 2nd sem.)

Preparation: 3.101 Servomechanisms Theory

Course Content: Servomechanisms theory embodying analysis and synthesis using logarithmic representation of transfer-function vector contours. Various compensation methods and the techniques of network design. Study of dynamic characteristics of electrical, mechanical, and hydraulic components used in typical servomechanisms. Quantitative specification, design, and testing of complex feedback control systems. Class demonstrations of typical servomechanisms and components.

3.103 Advanced Feedback Control Systems (Offered 1962-63, 1st sem.)

Preparation: 3.102 Advanced Servomechanisms

Course Content: Advanced studies of feedback control systems using frequency-response techniques and compensation. Design for minimum integral-square error. System design in presence of constraints. Methods of obtaining transient response from frequency response. Introduction to root-locus method. Components performance, specification, and design. Theory of analysis of nonlinear and discontinuous systems. Consideration and study of nonlinear effects such as saturation, backlash, and friction. Also, the effects of discontinuities such as sampling and quantization.

3.201 Pulse and Digital Circuits (Offered yearly, 1st sem.)

Preparation: Transient analysis using Laplace transforms, electronic circuits

Course Content: A treatment of the principles and techniques of pulse-forming and pulse-processing circuits basic to radar, television, digital computation, pulse-modulation systems, and data-processing systems. A review of wave-shaping circuits and transistor-circuit fundamentals, followed by a study of wide-band linear amplifiers of pulse signals. Piecewise-linear techniques and graphical methods of analysis as applied to such nonlinear circuits as clippers, clampers, binaries, multivibrators, and sweep generators. The devices considered are instrumented with tubes, semiconductor devices such as transistors and diodes, magnetic-circuit elements, super-conductive elements, etc.

3.202 Pulse and Digital Circuits (Offered yearly, 2nd sem.)

Preparation: 3.201 Pulse and Digital Circuits

Course Content: Extension of the methods of 3.201 to the analysis and design of pulse transformers, blocking oscillators, d-c to d-c converters, delay lines, distributed-line amplifiers, counting circuits, logical circuits, gates and voltage comparators. Typical pulse and digital systems are discussed with some consideration given to receiver noise figure and methods of improving the signal-to-noise ratio.

3.203 Introduction to Analog and Digital Computers
(Open only to co-operative engineering students)
(Offered yearly, 1st sem.)

Preparation: A Bachelor of Science degree which includes coverage of electronic circuits

Course Content: This course provides an introduction to the understanding and utilization of analog and digital computers. The elements of analog computers are discussed, including adders, integrators, multipliers and function generators. Illustrative examples are given and the scale factor problem is discussed in detail. The basic elements of digital computers are discussed, including counters, storage devices, logic circuits and input equipment. An introduction is given to programming problems for solution on digital machines.

3.204 Digital Computer Coding and Logic
(Offered yearly, 1st sem.)

Preparation: A bachelor's degree in engineering or science

Course Content: This course is designed as a survey of the basic logic and techniques involved in the design and use of digital computers. Topics discussed will include the following: functions of a computer, logical design, basic components, principles of coding, input and output systems.

Considerable time will be spent on the translation of arithmetical and logical operations into digital computer instructions. Examples will be taken from typical business, engineering, scientific, and real-time control problems. It is expected the course will include at least one visit to a large scale computer in the Boston area.

3.215 Computing and Control Devices
(Offered yearly, 2nd sem.)

Preparation: Advanced electronic circuits, including coverage of basic pulse circuits

Course Content: Review of pulse circuit fundamentals. Engineering organization of computers. Boolean algebra; electronic switching circuits, electro-mechanical components, basic magnetic circuits; reliability techniques; acoustic, electrostatic and magnetic storage techniques; digital control units; transducers, operational-digital techniques; current and future developments.

3.221 Radar Engineering (Offered yearly, 1st sem.)

Preparation: Transients, basic electronic circuits

Course Content: This course emphasizes the systems aspects of radar engineering. Included among the topics are the prediction of radar range performance; a discussion of pulsed, CW, and MTI radars; tracking radars; radar transmitters and antennas.

3.222 Radar Engineering (Offered yearly, 2nd sem.)

Preparation: 3.221 Radar Engineering

Course Content: Continuation of 3.221, a further consideration of the systems aspects of radar engineering. This course covers radar receivers; detection of radar signals in noise; electromagnetic propagation; clutter and weather effects; system design principles and examples of radar systems.

3.231 Switching Circuits (Offered yearly, 1st sem.)

Preparation: A bachelor's degree in engineering or science

Course Content: Basic relay networks will be treated by the methods of switching algebra. Combinational, sequential and counting circuits will be given as well as the theory of error detecting and translating circuits.

3.232 Switching Circuits (Offered yearly, 2nd sem.)

Preparation: 3.231 Switching Circuits

Course Content: Application of the material covered in 3.231. This includes work with iterative networks, sequential circuits, and special coding techniques.

3.301 Theory of Microwaves (Offered yearly, 1st sem.)

Preparation: Advanced calculus, including coverage of Laplace's and the wave equations, vector analysis and the calculus of vectors

Course Content: The static and time-varying electric and magnetic fields. Integral and differential forms of Maxwell's equations, and boundary relations. Scalar and vector potentials. Circuit concepts at high frequencies. Poynting's vector and energy theorems. Development of wave equations. Plane waves in dielectric and conducting media.

3.302 Theory of Microwaves (Offered yearly, 2nd sem.)

Preparation: 3.301 Theory of Microwaves

Course Content: Development of transmission line equations and their solutions. Transmission line charts. TE and TM modes in hollow rectangular and circular waveguides. The impedance concept, energy density, and power flow in waveguides. General microwave-circuit theorems. The termination of a single waveguide. The junction of several waveguides. Impedance and admittance matrices. Scattering matrix.

3.311 High-Voltage Engineering (Offered 1962-63, 2nd sem.)

Preparation: A-C theory

Course Content: Insulation of the solid and liquid types. Lightning, surge protection in general, and insulation coordination. Corona. Destructive and nondestructive testing methods.

3.401 Transients in Linear Systems
(Offered yearly, 1st and 2nd sem.)

Preparation: Undergraduate course in transient analysis using Laplace transforms

Course Content: A comprehensive treatment covering the application of Laplace transforms to the determination of the responses of representative engineering systems, including those involving electrical, mechanical, hydraulic, and thermal components.

3.402 Transients in Linear Systems
(Offered yearly, 1st and 2nd sem.)

Preparation: 3.401 Transients in Linear Systems

Course Content: A continuation of 3.401 to include application to more complex systems. Complex-variable theory as it relates to the evaluation of the inversion integral, is covered. Application is made to the determination of stability criteria and of the behavior of distributed-parameter systems. Solution of linear difference equations by the Laplace-transform method, and their applications.

3.411 Power System Stability (Offered 1961-62, 1st sem.)

Preparation: Polyphase A-C circuits, A-C machinery

Course Content: Includes a study of steady-state power limits and transient stability of electric power systems.

3.412 Protective Relaying, as Applied to Power Systems
(Offered 1961-62, 2nd sem.)

Preparation: Polyphase A-C circuits, A-C machinery

Course Content: Types of relays, calculation of short-circuit currents, the selection of the proper relay, and the solution of practical relaying problems.

3.501 Communication Theory—Introduction

(Offered yearly, 1st and 2nd sem.)

Preparation: 14.102 Advanced Mathematics, or 3.402 Transients in Linear Systems, or 3.902 Electric Circuit Theory

Course Content: First of three courses on communication theory to present an engineering analysis of statistical communication problems. This course is designed to provide the basic tools for the study of information theory and detection theory which are the subject matters of the two following courses. Particular subjects include: signal theory, Fourier analysis, power spectrum and correlation function, sampling theorem, spectrum and noise in amplitude, angular and pulse modulation, an introduction to probability theory.

3.502 Communication Theory—Information Theory

(Offered yearly, 1st sem.)

Preparation: 3.501 Communication Theory—Introduction

Course Content: Second course on communication theory to present an engineering analysis of statistical communication problems. This course can be taken in addition to 3.503 although it is treated independently of that course. The course deals principally with three aspects of information theory: the statistical measure of information, the determination of channel capacity and the fundamental coding theorems.

3.503 Communication Theory—Detection Theory

(Offered yearly, 2nd sem.)

Preparation: 3.501 Communication Theory—Introduction

Course Content: Third course on communication theory to present an engineering analysis of statistical communication problems. This course can be taken in addition to 3.502 although it is treated independently of that course. The course deals with the theories of detection and extraction of signals in the presence of noise. Particular subjects include: description of random processes, detection process as testing of hypothesis, correlation detection, matched filtering, optimum linear filtering and prediction.

3.504 Special Topics in Communication Theory

(Offered 1961-62, 4th term)

Preparation: 3.502 Communication Theory—Information Theory, or 3.503 Communication Theory—Detection Theory

Course Content: Efficient coding and information compression, redundant coding and design of signalling alphabet, channel combinations and corrections.

3.601 Industrial Electronics (Offered 1961-62, 1st sem.)

Preparation: Basic electronics and circuits

Course Content: Emission, conduction of gases. Thermionic vacuum and gas tubes, cold-cathode tubes, phototubes and photoelectric cells. Study of the oscilloscope; electromagnetic and electrostatic deflection and focusing in cathode-ray tubes; sweep circuits, control circuits, etc. Applications of the oscilloscope. Design and analysis of electronic circuits employing phototubes, pulsed-light sources, etc.

3.602 Industrial Electronics (Offered 1961-62, 2nd sem.)

Preparation: 3.601 Industrial Electronics

Course Content: Review of meter movements. Electronic instrumentation and measurements. Magnetic control devices. Consideration of recently developed circuit elements including saturable reactors, etc. Magnetic amplifiers.

3.605 Transistor Circuit Engineering (Offered yearly, 1st sem.)

Preparation: Basic electronics and electric circuits

Course Content: Nonmathematical introduction to transistor physics. Equivalent circuits and mathematical analysis of basic amplifier configurations. D-C bias circuits. Noise.

3.606 Transistor Circuit Engineering (Offered yearly, 2nd sem.)

Preparation: 3.605 Transistor Circuit Engineering

Course Content: Design of audio and power amplifiers. High-frequency operation, radio-frequency amplifiers, and oscillators. Switching circuits.

3.611 Advanced Electrical Machinery (Offered yearly, 1st sem.)

Preparation: A-C theory, A-C and D-C machinery

Course Content: Analytical development of the principles of operation of rotating electrical machinery. Special topics in the operation of D-C machines and A-C synchronous machines.

3.612 Advanced Electrical Machinery (Offered yearly, 2nd sem.)

Preparation: 3.611 Advanced Electrical Machinery

Course Content: Special topics in the operation of transformers, A-C asynchronous machines, and fractional-horsepower machines. Transient operation of electrical machines. Theory of dynamic operation of electrical machines in servomechanisms and control systems.

3.701 Electronic Engineering (Offered yearly, 1st sem.)

Preparation: Basic electronics and circuits, 3.402 Transients in Linear Systems

Course Content: Laplace transform theory is extended to cover linear active circuits, with emphasis on stability considerations. Signal-flow graphs, Nyquist diagrams, log-db plots, and root-locus methods are considered. The methods are illustrated by examples from stagger-tuned amplifiers, selective R-C amplifiers, pulse amplifiers, computer amplifiers, and D-C amplifiers.

3.702 Electronic Engineering (Offered yearly, 2nd sem.)

Preparation: 3.701 Electronic Engineering

Course Content: The use of Laplace transform theory and active circuit theory in the design of vacuum-tube and transistor amplifiers which must meet exacting requirements of some sort. Stagger-tuned amplifiers with maximum gain-bandwidth product, pulse amplifiers with maximum linear ranges, amplifiers with crystal and mechanical filters, and amplifiers with minimum noise and maximum sensitivity.

3.801 Application of Microwaves (Offered yearly, 1st sem.)

Preparation: 3.302 Theory of Microwaves

Course Content: Review of microwave circuit theorems. Generalized waveguide theory formulated by Schwinger. Waveguide circuit elements, obstacles, and discontinuities. Dielectrics in waveguides. Ferrites in waveguides—the microwave gyrator. Theory of cavity resonator and its equivalent circuits. Radiation of microwaves. Retarded potentials. Far-zone and near-zone fields due to charge and current distributions.

3.802 Application of Microwaves (Offered yearly, 2nd sem.)

Preparation: 3.801 Application of Microwaves

Course Content: Theory of the antenna. The driven antenna as a circuit element. Coupled antennas and transmission lines. The receiving antenna as a circuit element. Antenna arrays. Generation of microwaves. Klystrons and magnetrons. The periodical structures. Traveling-wave amplifiers and oscillators. Microwave measurements, including the measurements of wavelength, frequency, frequency spectrum, and impedances. Theory of diffraction of microwaves. Scattering by conducting sphere, cylinder and plane obstacles.

3.803 Electromagnetic Wave Propagation
(Offered 1961-62, 1st sem.)

Preparation: 14.102 Advanced Mathematics or equivalent

Course Content: Topics in wave propagation of prime importance in communications. Review of fundamentals of Maxwell's theory and wave equations. Theory of propagation over flat and spherical earth. Influence of ground constants. Theory of refraction, absorption and scattering in the troposphere. Tropospheric scatter communication characteristics.

3.804 Electromagnetic Wave Propagation
(Offered 1961-62, 2nd sem.)

Preparation: 3.803 Electromagnetic Wave Propagation

Course Content: Continuation of wave propagation theory. Ionized media. Propagation through and reflection from ionized layers. Characteristics of the ionosphere and their significance to communications. Ionospheric scatter communication. Reflections from meteor trails and their use for burst communication. Survey of noise sources. Communication through random multipath media.

3.901 Electric Circuit Theory (Offered yearly, 1st sem.)

Preparation: A-C circuit theory, differential equations

Course Content: General analysis of n -loop networks by loop current and branch voltage variables using matrix algebra. Driving-point and transfer immittances. The two terminal-pair, image parameters, conventional filter theory including constant "k" and "m"-derived filters. Bartlett's bisection theorem, the symmetrical lattice, and lattice-derived filters.

3.902 Electric Circuit Theory (Offered yearly, 2nd sem.)

Preparation: 3.901 Electric Circuit Theory

Course Content: Discussion of the necessary and sufficient conditions for the physical realizability of impedance functions, positive real functions, and Hurwitz polynomials. The Foster and Cauer canonic forms for R-L and R-C networks. The Brune process as well as the work of Darlington, Cauer, and Bode are discussed.

3.903 Linear Synthesis I (Offered 1961-62, 1st term)

Preparation: 3.901 Electric Circuit Theory

Course Content: Driving-point synthesis—L-C, R-C, R-L and R-L-C; energy functions; general network properties; the approximation problem; potential analogs.

3.904 Linear Synthesis II (Offered 1961-62, 3rd term)

Preparation: 3.903 Linear Synthesis I

Course Content: Transfer-function synthesis—general network parameters; lossless networks terminated by one ohm; lattice synthesis procedures; networks loaded at both ends; R-C network synthesis; the approximation problem; time domain methods.

3.905 Nonlinear Circuits I (Offered 1961-62, 2nd term)

Preparation: 3.901 Electric Circuit Theory

Course Content: Linear active circuits—derivation of linear active circuits; effect of capacitance-gain-bandwidth relationships; general feedback theory; signal flow graphs; active filters; sensitivity to parameter changes; the effects of noise in circuits.

3.906 Nonlinear Circuits II (Offered 1961-62, 4th term)

Preparation: 3.905 Nonlinear Circuits I

Course Content: Nonlinear theory—phase space methods; first and second order systems; oscillators; forced systems; sub-harmonics; describing function methods; piecewise linear methods; nonlinear feedback systems.

3.911 Electric Power Circuits (Offered 1962-63, 1st sem.)

Preparation: Polyphase A-C circuits, A-C machinery

Course Content: Review computation of line constants. Study of skin and proximity effects. Steady-state analysis of short and long lines by analytical and graphical means. Equivalent circuits. Power-factor correction. Interference with communications and other circuits.

3.912 Electric Power Circuits (Offered 1962-63, 2nd sem.)

Preparation: 3.911 Electric Power Circuits or equivalent

Course Content: Fundamentals of symmetrical components. Study of impedance to sequence currents of short and long transmission lines, cables, trans-

former banks, and machines. Grounding of power systems. Application of symmetrical and related components to steady-state analysis of balanced and unbalanced power circuits.

3.915 Electric Power Distribution (Offered 1962-63, 1st sem.)

Preparation: 3.912 Electric Power Circuits or consent of instructor

Course Content: Loads and their characteristics, including distribution, density, growth, demand, diversity factor, load factor, power factor, power and lighting loads; types of distribution systems, D-C and A-C; primary distribution, including radial and network, substation location, arrangement of primary circuits, regulation, primary voltage; secondary distribution, including radial, network, feeders, transformers, regulation; transformer size, location, loading connections, and characteristics; voltage regulation; protective devices; overhead and underground construction.

3.951 Seminar (Offered yearly)

Course Content: A comprehensive survey of the literature in the field of the student's proposed thesis. Written and oral reports summarize the survey findings. A two-hour class session is held each week during which the student is informed about library survey methods or discusses topics of current scientific interest led by faculty or guest lecturers.

3.953 - 3.954 Thesis (Offered yearly)

Course Content: Experimental work conducted under the auspices of the department.

3.955 Thesis (Offered yearly)

Preparation: Admission to the Ph.D. program

Course Content: Experimental work conducted under the auspices of the department.

ENGINEERING MANAGEMENT

Admission

To be enrolled for graduate work in engineering management, applicants must have obtained a bachelor of science degree in an engineering field from a recognized institution. Those who have a Bachelor of Science degree in Industrial Engineering may proceed with the program. Applicants with degrees in other branches of engineering will be required to make up any deficiencies in industrial management, accounting, and statistics. The Graduate School offers certain courses to satisfy these deficiencies.

THE MASTER'S DEGREE

EVENING PART-TIME PROGRAM

Required Courses

5.101	Analysis of the Industrial Enterprise	2
5.102	Engineering Economy	2
5.201	Finance	2
5.202	Industrial Budgeting	2
5.203	Industrial Forecasting	2
5.301	Manufacturing Analysis	2
5.401	Marketing	2
5.601	Human Factors in Industrial Operations	2

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ELECTIVES

Four semester hours must be elected from engineering management courses. Ten semester hours may be elected from any courses in engineering or science for which the student has the necessary preparation.

DESCRIPTION OF COURSES

Noncredit courses for the purpose of fulfilling deficiencies in order to proceed with the engineering management program.

5.50 Industrial Management (Offered yearly, 1st sem.)

Preparation: Bachelor of Science degree in engineering

Course Content: An introduction to the general problems of competitive industry and modern scientific management methods. Origin of the factory system, development of management principles and types of organizational structures; over-all policies; plant location and layout; machinery and equipment; transportation and material handling; plant services, maintenance; research, patents, design and development; manufacturing economics.

5.51 Industrial Management (Offered yearly, 2nd sem.)

Preparation: 5.50 Industrial Management

Course Content: A continuation of course 5.50 with particular emphasis on personnel management and practices. Production control, quality control, motion and time study, purchasing, selling, foremanship, wage and salary administration, job evaluation and merit rating, personnel, union relations, cost reduction and control, computers, operations research.

5.52 Industrial Accounting (Offered yearly, 1st sem.)

Preparation: Bachelor of Science degree in engineering

Course Content: A foundation in basic principles and bookkeeping procedures. Recording of the ordinary transactions of a trading business, the preparation of financial statements and the handling of controlling accounts and subsidiary ledgers. Clerical work is minimized and stress laid on the service of accounting to management and successful business operation.

5.53 Industrial Accounting and Business Statistics (Offered yearly, 2nd sem.)

Preparation: 5.52 Industrial Accounting

Course Content: A continuation of course 5.52 providing a foundation in cost accounting theory and practice. Introduction to budgetary practices and procedures, statement analysis and interpretation.

The latter portion of time in this course is devoted to the use of statistical data in business. A study is made of the nature, source, collection, and organization of statistical facts; the presentation of such facts in tabular or graphic form; the various averages and measures of dispersion; time series analysis; use of index numbers.

5.54 Engineering Statistics (Offered 1961-62, 1st sem., and summer, 1961)

Preparation: Business Statistics portion of 5.53

Course Content: A continuation of the statistical portion of 5.53 with emphasis on the engineering applications of statistics. Statistical inferences concerning a mean, significant differences, miscellaneous types of inference; correlation in general, including simple linear, multiple and partial correlation. Introduction of statistical theory as applied in quality control.

GRADUATE COURSES

5.101 Analysis of the Industrial Enterprise

(Offered yearly, 1st and 2nd sem.)

Preparation: Industrial management

Course Content: A comprehensive study of the development and growth of industrial enterprises, both large and small, and the management philosophies which have spelled success or failure. An examination of the competitive relations of the companies within each industry. Financial statements; discussion of fourteen important operating ratios and trends in a wide range of American industry. Business failures and conclusions as to causes. Planning to meet customers' needs calls for discussion of market and economic research, customer research, product design and styling, and of engineering research and development. Centralized policy and decentralized administration in large organizations and attendant problems are examined, and their application in smaller organizations discussed. The importance of human relations; the development of executive personnel at all levels.

5.102 Engineering Economy (Offered yearly, 1st and 2nd sem.)

Preparation: Bachelor of Science degree in engineering

Course Content: The fundamental objective is to explain the technique of answering the "Will it pay?" question in engineering situations. The time value of money; the variance of points of view of the accountant and the engineer as affecting the solution are clearly brought out. Discussions of replacement economy include consideration of the M.A.P.I. formula and theory.

5.103 Engineering and Research Administration

(Offered 1961-62, 1st sem.)

Preparation: 5.101 Analysis of the Industrial Enterprise

Course Content: Current developments in the management of research activities and the background of engineering, research, and development in industry; the responsibility of management for engineering and research programs; choice of objectives and plans, magnitude of projects and programs, evaluation of research, administration of personnel; engineering and research facilities; relationship of research to other functional areas of the organization.

5.104 Engineering Surveys and Reports—Seminar

(Offered 1961-62, 1st sem.)

Preparation: 5.101 Analysis of the Industrial Enterprise

Course Content: Principles and methods employed by engineers in surveying and reporting on existing and proposed industrial operations. Development of criteria for such evaluation. Problems of applying appropriate units of measurement for such criteria. Oral and written reports on an actual industrial survey.

5.106 Executive Development (Offered 1961-62, 2nd sem.)

Preparation: 5.101 Analysis of the Industrial Enterprise

Course Content: The impact of new corporate dimensions—popular ownership, professional management; public responsibility; the customer; ethical standards. The challenge of top-range planning, information for decision making, human motivation, social-political questions impinging on the business community. Managerial philosophies—decentralization and attendant problems; development of men; leading through persuasion not command; integration, teamwork, balanced communications. Sharing the vision of the future.

5.201 Finance (Offered yearly, 2nd sem.)

Preparation: 5.101 Analysis of the Industrial Enterprise

Course Content: A study of the financial structure of the American economy and of the financial organization of business units. An analysis of the basic principles governing the financial operations of business, including administrative tools of financial management and the principles and instruments of short-term and long-term financing. A resumé of such topics as methods of valuing a business, promotion, expansion, consolidation, refinancing, and reorganization.

5.202 Industrial Budgeting (Offered yearly, 1st sem.)

Preparation: Industrial accounting

Course Content: Budgeting in industry today. The introduction of budgeting procedures in business. Preparation, execution, and control of budgets. Sales, inventory, production, expense, cash, research, and investment budgets.

5.203 Industrial Forecasting (Offered 1961-62, 2nd sem.)

Preparation: Industrial statistics

Course Content: The classical techniques of forecasting and their relative advantages and disadvantages. Particular emphasis is directed toward the necessary requirements and aptitudes of the forecaster himself—his scientific approach, familiarity with the questions to be answered and the uses that will be made of those answers; knowledge of sources of data within and outside of the company; resourcefulness and ability in developing his own data in the field; devising procedures for pretesting the product, the advertising, the promotion, the distribution, and most important, the sales performance. Forecasting as an aid to management in making long-range plans.

5.301 Manufacturing Analysis (Offered yearly, 2nd sem.)

Preparation: Bachelor of Science degree, industrial statistics, industrial management

Course Content: Study of the development of conceptual models to represent industrial operations and study of the usefulness and limitations of such models provides an introduction to the more intensive treatment that will be provided in the Operations Research sequence that follows as an elective

area. Models included are process flow charts, Gantt charts, and other schematic models as well as more intensive study into mathematical models such as linear programming, Monte Carlo analysis, analysis of variance, and total value analysis. Some aspects of the use of large computers in the treatment of such models is studied.

5.304 Advanced Work Measurement (Offered 1961-62, 1st sem.)

Preparation: Bachelor of Science degree in Industrial Engineering or equivalent

Course Content: A critical evaluation of methods study and work measurement procedures. A study of techniques including standard data, work sampling, predetermined time systems (MTM, Work Factor, BMT, DMT), merit rating, factor method, past performance data employing analysis by least squares and multiple correlation. Case studies on financial and non-financial incentives such as indirect workers, clerical, technical, and maintenance.

5.401 Marketing (Offered yearly, 1st sem.)

Preparation: 5.101 Analysis of the Industrial Enterprise

Course Content: The structure and operation of our distributing mechanism and the functioning of its various parts. The Federal Trade Commission and its enforcement of interstate commerce and foreign trade legislation as affecting trade practices; trade association activities, permissive and barred. Various aspects of marketing such as product development, market research, direction of the sales force, advertising, warehousing, and other distribution costs, all as affected by competitive pricing and distribution policies. The role of service. Value from the buyer's standpoint.

5.501 Introduction to Operations Research (Offered 1961-62, 1st sem.)

Preparation: 5.301 Manufacturing Analysis

Course Content: An introduction to the various techniques used in Operations Research, i.e., the development of mathematical models for industrial decision problems, followed by a more intensive study of linear programming and some total value maximization and minimization models such as optimum inventory. Study of actual problem situations is emphasized.

5.502 Introduction to Operations Research (Offered 1961-62, 2nd sem.)

Preparation: 5.501 Introduction to Operations Research

Course Content: A continuation of the study begun in 5.501 commencing with a consideration of incremental analysis in optimization models. Later study concerns the influence of uncertainty in mathematical models including emphasis on total value and incremental analysis problems as well as some treatment of queuing theory. Both rigorous mathematical developments and approximation techniques such as the Monte Carlo technique are considered. Here again study of actual problem situations is emphasized.

5.601 Human Factors in Industrial Operations

(Offered yearly, 2nd sem.)

Preparation: Bachelor of Science degree in Industrial Engineering or equivalent

Course Content: A consideration of the knowledge and methods in the field of management of human relations in industry. Emphasis is placed on the effects of various patterns of human organization on morale and effectiveness. Topics discussed include executive education, formal and informal organization, motivation, and communications.

5.602 Seminar in Contemporary Industrial Problems

(Offered 1961-62, 2nd sem.)

Preparation: 5.101 Analysis of the Industrial Enterprise

Course Content: Study of contemporary industrial and economic issues and developments. Development of facility in appraisal of current trends. Stimulation of interest in business relationships with government, labor, and the public.

5.603 Labor-Management Relations

(Offered 1961-62, 2nd sem.)

Preparation: Bachelor of Science degree in Industrial Engineering or equivalent

Course Content: The development of employer-employee relations from free individualistic theories to labor markets and industrial relations systems influenced by management-union bargaining. The functioning of unions and the impact on managerial authority of collective bargaining, the content of agreements, their negotiation and administration, grievance procedures, and arbitration will be analyzed. Power conflicts and co-operative relations will be studied along with the legislation that regulates labor union activities, management practices, and collective bargaining relations.

MECHANICAL ENGINEERING

Admission

To be enrolled for graduate work leading to the degree of Master of Science in Mechanical Engineering, applicants must have obtained a Bachelor of Science degree in Mechanical Engineering from a recognized institution. Applicants with a bachelor's degree in other fields and an appropriate background of preparation may pursue this program and qualify for the degree of Master of Science without specification.

THE MASTER'S DEGREE

FULL-TIME PROGRAM ON CO-OPERATIVE PLAN

The full-time program in mechanical engineering operates on the co-operative plan as outlined in the general regulations of the Graduate School and the Academic Calendar shown in this section of the catalogue. Students will be expected to follow the plan of study as outlined below. At the beginning of the second year an advisor for each student will be appointed who will approve the thesis option if allowed.

Master of Science in Mechanical Engineering

FIRST YEAR

First Term		Second Term	
2.201	Theory of Elasticity 2	2.202	Theory of Elasticity 2
2.211	Vibration Theory 2	2.212	Vibration Theory 2
14.101	Advanced Mathematics 2	14.102	Advanced Mathematics 2
	or		Elective 2
14.106	Advanced Mathematics 2		
	Elective 2		8
	8		

SECOND YEAR

First Term		Second Term	
2.213	Advanced Dynamics 2	2.214	Advanced Dynamics 2
2.901	Thesis or Electives 2	2.902	Thesis or Electives 2
	Electives 4		Elective 2
	8		6

ELECTIVES

The electives may be taken from the following courses:

2.200	Adv. Mechanics of Materials	2.222	Fluid Dynamics
2.203	Adv. Mechanics of Materials	2.311	Advanced Thermodynamics
2.205	Experimental Stress Analysis	2.312	Advanced Thermodynamics
2.221	Fluid Dynamics	2.701	Physical Metallurgy
	2.702	Physical Metallurgy	

EVENING PART-TIME PROGRAMS

The admission requirements for these programs are the same as for the full-time program, but students may progress according to their abilities and the time available. Students who have not had the equivalent of 14.101 Advanced Mathematics must register for this course as their mathematics elective.

Master of Science in Mechanical Engineering

REQUIRED COURSES

Mechanics Major			Heat-Power Major		
2.201	Theory of Elasticity	2	2.301	Heat Transfer	2
2.202	Theory of Elasticity	2	2.302	Heat Transfer	2
2.213	Advanced Dynamics	2	2.311	Advanced	
2.214	Advanced Dynamics	2		Thermodynamics	2
2.211, 212	Vibration Theory		2.312	Advanced	
	or	4		Thermodynamics	2
2.221, 222	Fluid Dynamics		2.501	Power Plant Economics	2
14.101	Advanced Mathematics		2.502	Power Plant Economics	2
	or	2	14.101	Advanced Mathematics	
	Mathematics Elective			or	2
14.102	Advanced Mathematics	2		Mathematics Elective	
		—	14.102	Advanced Mathematics	2
		16			—
					16

ELECTIVES

Eight semester hours must be elected from mechanical engineering courses. Six semester hours may be elected from any courses in engineering or science for which the student has the necessary preparation.

DESCRIPTION OF COURSES

2.200 Advanced Mechanics of Materials (Offered yearly, 1st and 2nd sem.)

Preparation: Strength of materials

Course Content: Stresses at a point, theories of failure, thick cylinders under elastic and plastic deformation, shear stress distribution, location of shear center, bending stresses due to nonsymmetrical loading, bending of flat plates, curved beams, the significance of fatigue, stress concentration, the resistance of materials to stress. Experimental methods and practical problems are discussed.

2.201 Theory of Elasticity (Offered yearly, 1st sem.)

Preparation: One year of strength of materials, 14.101 Advanced Mathematics (may be taken simultaneously)

Course Content: Analysis of stress and strain in two and three dimensions, principal stresses and strains, differential equations of equilibrium, boundary conditions, compatibility equations, stress function, determination of displacements, equilibrium conditions in terms of displacements. Solution of problems in two dimensions.

2.202 Theory of Elasticity (Offered yearly, 2nd sem.)

Preparation: 2.201 Theory of Elasticity, 14.102 Advanced Mathematics (may be taken simultaneously)

Course Content: A continuation of 2.201 with application to the solution of problems in three dimensions.

2.203 Advanced Mechanics of Materials (Offered 1961-62, 2nd sem.)

Preparation: Differential Equations and 2.200 Advanced Mechanics of Materials

Course Content: Buckling of compression members with and without transverse loads; eccentricity and curvature, comparison of general design expressions for columns, torsion of noncircular sections, contact stresses, solution of plates by grid analogy.

2.205 Experimental Stress Analysis (Offered yearly, 2nd sem.)

Preparation: 2.200 Advanced Mechanics of Materials or equivalent

Course Content: Theoretical and practical consideration of methods of determining stress distributions. The fundamental theory basic to the various methods will be emphasized and a comparison of the results obtainable by these methods will be made. Photoelasticity, brittle lacquers, strain gauge techniques, and instrumentation are a few of the methods given consideration.

2.211 Vibration Theory and Applications
(Offered yearly, 1st sem.)

Preparation: Differential equations, dynamics

Course Content: Single degree of freedom; damping, forced vibration, resonance, phase relationships, vibration isolation, multiple degrees of freedom; free and forced vibration with and without damping, extensional and torsional oscillations and electrical analogies, frequency equation, energy in a vibrating system, energy methods of solution, Rayleigh's Method.

2.212 Vibration Theory and Applications
(Offered yearly, 2nd sem.)

Preparation: 2.211 Vibration Theory and Applications

Course Content: A continuation of 2.211 including systems with distributed mass and stiffness, critical speeds of shafts, engine balancing, stability criteria, gyroscope, nonlinear vibrations, experimental study of vibrations, graphical and semigraphical analysis, Fourier analysis.

2.213 Advanced Dynamics (Offered yearly, 1st sem.)

Preparation: Dynamics, 14.101 Advanced Mathematics (may be taken simultaneously)

Course Content: Application of fundamental laws of motion. Dynamics of a particle, rectilinear motions in a resisting medium, linear and nonlinear vibrations, motion in a plane, motion of a projectile. Linear and angular momentum, impact.

2.214 Advanced Dynamics (Offered yearly, 2nd sem.)

Preparation: 2.213 Advanced Dynamics, 14.102 Advanced Mathematics (may be taken simultaneously)

Course Content: Further applications of laws of motion. Engine balancing, kinetic energy and work, dynamics of systems with constraints, generalized coordinates, LaGrangian Equations, Hamilton's Principle, Euler's Equations, rotation of a rigid body.

2.221 Fluid Dynamics (Offered yearly, 1st sem.)

Preparation: Hydraulics, dynamics, 14.102 Advanced Mathematics

Course Content: Principles of incompressible fluid flow in two and three dimensions, stream function, velocity potential, application of complex variables, analytic functions, orthogonal nets, conformal maps, two and three dimensional flow problems.

2.222 Fluid Dynamics (Offered yearly, 2nd sem.)

Preparation: 2.221 Fluid Dynamics

Course Content: Continuation of two dimensional incompressible flow problems by conformal mapping, Blasius theorem, Jonkowski airfoils, Schwarz-Christoffel theorem, free streamlines, Vortex flow, introduction to boundary layer theory.

2.301 Heat Transfer (Offered yearly, 1st sem.)

Preparation: Elements of heat transfer, 14.102 Advanced Mathematics

Course Content: Heat transfer by conduction in steady state, two dimensional applications, cylindrical coordinates, relaxation method, field mapping solutions, nonsteady state conduction, heating and cooling of solids, Schmidt's method and electrical analogy solutions. Radiation, basic definitions, theoretical aspects, application to engineering problems, geometry factor, Hottel's determinant type solutions, gas radiation, and furnace design.

2.302 Heat Transfer (Offered yearly, 2nd sem.)

Preparation: 2.301 Heat Transfer

Course Content: Dimensional analysis; Reynolds, Prandtl, and Nusselt numbers; Reynolds analogy; elements of boundary layer theory and contributions of Prandtl, Taylor, von Karman, and Martinelli; forced convection, natural convection, condensation, and boiling; Nusselt's derivation; analogy of heat and mass transfer, diffusion of fluids, and application to drying problems

2.311 Advanced Thermodynamics (Offered yearly, 1st sem.)

Preparation: Thermodynamics, differential equations

Course Content: Laws of thermodynamics, properties of substances, steady and unsteady flow, reversibility, contributions of Carnot and Clausius, ideal gases, gas and steam tables, mixtures of ideal gas, air-water mixtures, processes involving chemical reactions and mixing.

2.312 Advanced Thermodynamics (Offered yearly, 2nd sem.)

Preparation: 2.311 Advanced Thermodynamics

Course Content: Thermodynamic relations for pure substances, contributions of Maxwell, Clapeyron, Gibbs, Helmholtz, Vander Waal, and Beattie-Bridgman; law of corresponding states; thermodynamics of chemistry, solutions, combustion; equilibrium criteria; unstable, meta-stable, neutral and stable, and critical states; equilibrium of heterogeneous substances, chemical potential, phase rule, osmotic pressure, and surface tension.

2.401 Pumps (Offered 1961-62, 1st sem.)

Preparation: Hydraulics

Course Content: Flow of fluids in pipes and ducts, head on pumps, fans and blowers; development of head, net positive suction head, cavitation and specific speed of pumps; affinity laws, selection of pumps to suit various operating conditions and methods of driving; automatic operation, types of construction and materials used, methods of priming centrifugal pumps, pumping of chemicals, oils and sludges, special problems of pump installation and operation, water hammer in pump discharge lines.

2.402 Fans and Blowers (Offered 1961-62, 2nd sem.)

Preparation: 2.401 Pumps, thermodynamics

Course Content: Flow of air in pipes and ducts, fan characteristics and laws, various types of fan wheels, inlet and outlet connections, fan capacity control,

fan selection and testing. Compression of air and gases, flow in pipes, head on blowers, performance curves, effect of changes in speed and inlet conditions, construction, regulation, selection, installation, and testing. Axial flow fans and blowers. Positive pressure blowers.

2.501 Power Plant Economics (Offered 1961-62, 1st sem.)

Preparation: Thermodynamics

Course Content: Cost of power and heat as required by various types of factories, hospitals, and other large buildings. Distribution of steam to groups of buildings for the most economical use of steam. Effective use of exhaust and bled steam for process, heat and air conditioning. Costs of power and heat by an isolated plant compared to that of purchased power.

2.502 Power Plant Economics (Offered 1961-62, 2nd sem.)

Preparation: 2.501 Power Plant Economics

Course Content: A continuation of 2.501, including computations covering an isolated steam plant with supplementary diesel equipment and public utilities breakdown connections.

2.511 Power Plant Design (Offered 1962-63, 1st sem.)

Preparation: 2.312 Advanced Thermodynamics

Course Content: Latest development in the theory and design of modern power generation for isolated and central stations. Computations for a small central station involving the size and type of boiler, prime movers, feed water heater, pumps, coal handling equipment.

2.512 Power Plant Design (Offered 1962-63, 2nd sem.)

Preparation: 2.511 Power Plant Design

Course Content: A continuation of 2.511, including an analysis and computations covering equipment for an isolated plant, including steam generating units, engines or turbines, condensing equipment, piping and general auxiliaries.

2.701 Physical Metallurgy (Offered yearly, 1st sem.)

Preparation: Engineering materials

Course Content: Introduction to physical metallurgy encompassing crystallography; equilibrium and nonequilibrium phase studies for 1, 2 and 3 component systems; theory of mechanical working of metals including elastic and plastic deformation, impact, fatigue, and creep; and theories of relieving work effects including recovery, recrystallization, and grain growth.

2.702 Physical Metallurgy (Offered yearly, 2nd sem.)

Preparation: 2.701 Physical Metallurgy

Course Content: The application of physical metallurgy theories to the study of the chemical and physical properties of iron, cast iron, steel, copper and nickel base alloys, aluminum, magnesium, and titanium.

2.707 Process Metallurgy (Offered 1962-63, 1st sem.)

Preparation: Engineering materials

Course Content: Introduction to process metallurgy encompassing production of metals from their ores; stoichiometric principles; metallurgical thermodynamics including the first, second and third laws; and the application of thermodynamics to metallurgical reactions.

2.708 Process Metallurgy (Offered 1962-63, 2nd sem.)

Preparation: Engineering materials and 2.707 Process Metallurgy

Course Content: The application of metallurgical thermodynamics to the study of melting and casting processes; hot and cold working processes; welding and alloy processes; mechanical working, cleaning and plating; gauging inspection and nondestructive testing.

2.709 Advanced Physical Metallurgy (Offered 1961-62, 1st sem.)

Preparation: Calculus and one year of physical chemistry, or 2.702 Physical Metallurgy

Course Content: Dislocation theories, electrical and magnetic properties of metals; deformation of metals; effect of permanent deformation; effects of elevated temperature; theories of oxidation; fracture.

2.710 Advanced Physical Metallurgy
(Offered 1961-62, 2nd sem.)

Preparation: Calculus and one year of physical chemistry, or 2.702 Physical Metallurgy

Course Content: Nucleation processes and structure of castings; allotropic transformations; phase rule and interpretation of equilibrium diagrams; solid-solid phase transformations; diffusion and age-hardening.

2.801 Fundamentals of Instrumentation
(Offered yearly, 1st sem.)

Preparation: Bachelor of Science degree

Course Content: Theoretical principles underlying the design and operation of instruments for measurement and/or control. Analysis of stimulus-response relations. Industrial instruments for measurement and control, including those based on pneumatic and electrical mechanisms.

2.802 Industrial Process Control (Offered 1962-63, 2nd sem.)

Preparation: 2.801 Fundamentals of Instrumentation

Course Content: Fundamental principles involved in automatic control of industrial processes. Economic considerations. Application of control instruments to obtain automatic control of temperature, pressure, fluid flow, liquid level, humidity, pH.

2.803 Automatic Control Engineering
(Offered 1961-62, 2nd sem.)

Preparation: Differential equations and 2.S01 Fundamentals of Instrumentation

Course Content: Fundamental principles of feedback systems, stability criteria, proportional derivative and integral action, physical components of feedback systems.

2.901 - 2.902 Thesis (Offered yearly)

Course Content: Analytical and/or experimental work conducted under the auspices of the department.

NUCLEAR ENGINEERING

Consideration is being given to the need for a graduate program in nuclear engineering, to be offered in the evening. The following courses cover introductory material which would be needed in such a program. These courses are open to graduates with a Bachelor of Science degree and may be used as electives in any engineering program.

15.223 Nuclear Physics for Engineers I

(Offered 1961-62, 1st sem.)

Preparation: 14.102 Advanced Mathematics

Course Content: Atomic structure with emphasis on the nucleus. Study of radiation. Characteristics, transmission, absorption, detection, and measurement. Nuclear reactions. Isotope formation and radioactive decay. Cross sections for absorption, scattering, fission.

15.224 Nuclear Physics for Engineers II

(Offered 1961-62, 2nd sem.)

Preparation: 15.223 Nuclear Physics for Engineers I

Course Content: Motion of charged particles in electromagnetic fields; motion of plasma in electromagnetic fields; Debay lengths, penetration of plasma in magnetic fields. Pinch effect and other principle applications.

GENERAL ENGINEERING

9.950 The Systems Approach (Offered 1961-62, 1st sem.)

Preparation: Bachelor of Science degree in engineering

Course Content: This course is intended for graduate engineers who have had some experience in the management of system development projects or who expect to get that opportunity in the near future. The course will provide an operational definition of the systems approach by relating the formal and empirical aspects of the scientific method to the orderly development and objective evaluation of such complex man-machine data-processing systems as air traffic control, missile guidance, radar early warning, etc. The lectures will cover in a qualitative way a variety of mathematical models useful in the rational design of the system, including probability, game theory, decision theory, information theory, linear programming, and network synthesis. Simulation on analog and digital computers will be reviewed. The human operator will be considered as a sensor and decision-making element. System evaluation will be discussed in terms of the requirements for good experimental design including problem generation, performance criteria and measurement, and analysis of variance. The course will not aim at meticulous instruction in any of the individual disciplines, but will show their relationship, utility and limitations. Readings and courses will be recommended for detailed exposition. Inferences will be drawn for the management of an interdisciplinary system design team.

GIFTS AND BEQUESTS

Northeastern University will welcome gifts and bequests for the following purposes:

- (a) For its building program.
- (b) For general endowment.
- (c) For specific purposes which may especially appeal to the donor.

It is suggested that, when possible, those contemplating gifts or bequests confer with the President of the University regarding the University's needs before legal papers are drawn.

The legal name of the University is "Northeastern University." However, in the making of gifts and bequests to Northeastern, the following wording is suggested: "Northeastern University, an educational institution incorporated under the laws of Massachusetts and located in Boston, Massachusetts."

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THE COLLEGE OF ENGINEERING

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Business — Offers evening programs leading to the degree of Master of Business Administration.

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Engineering — Offers day and evening programs leading to the degree of Master of Science with course specification and to the Ph.D. degree in Electrical Engineering.

UNIVERSITY COLLEGE

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